

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

Reserve
aSF85

.35
.A145P3

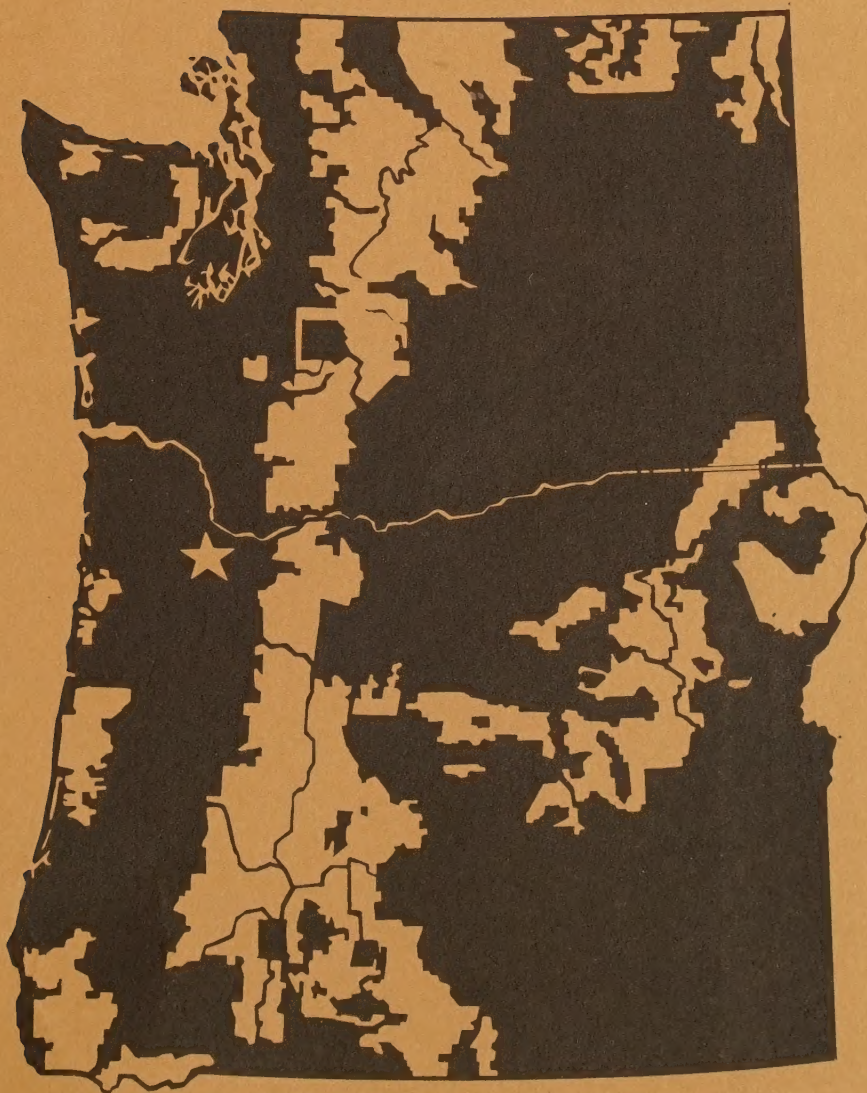
United States
Department of
Agriculture
Forest Service

Pacific
Northwest
Region



Draft

Pacific Northwest Region Plan



AD-33 Bookplate
(1-63)

NATIONAL

**A
G
R
I
C
U
L
T
U
R
A
L**



LIBRARY

Pacific Northwest Region Plan

MAY 7 1982

CATALOGING = PREP.

Table of Contents

	Page
Table of Contents	i
List of Tables	ii
List of Figures	iii
Introduction	
RPA Assessment and Program	1
Regional Planning	1
Local Plans — Forest and State	2
Program Development and Budgeting	2
Analysis of the Management Situation	
Introduction	5
Overview of the Region	5
Management Situations and Assessments — National Forest System	11
Management Situation — State and Private Forestry	46
Management Situation — Research Programs	53
Need to Change Management Direction	57
Planning Direction	
Introduction	59
Planning Direction to National Forests	59
Outdoor Recreation	59
Timber, Range and Wildlife Habitat	59
Timber Supply	60
Energy	60
Old-Growth Timber	61
RPA Outputs, Activities and Costs	
Pacific Northwest Region	65
National Forests	67
Management Standards and Guidelines	
Introduction	87
Standards and Guidelines	87
Silvicultural Systems	87
Size and Dispersal of Openings and State of Vegetation	87
Biological Growth Potential	88
Management Intensity and Utilization Standards	88
Unit of Measure (Mean Annual Increment)	89
Air Quality	89
Utility and Transportation Corridors	89
Northern Spotted Owl Habitat Management	89
Monitoring and Evaluation	92
List of Preparers	95
Index	96
Appendices	99

List of Tables — Regional Plan

	Page
Table 1	Timber Land Classification Summary 11
Table 2	Standing Inventory — Softwood Sawtimber on National Forests 12
Table 3	Timber Productivity — Commercial Forest Lands 12
Table 4	Standing Inventory — Softwood Sawtimber on Other Public and Private Ownerships 14
Table 5	Annual Growing Stock Losses from Insects and Diseases 14
Table 6	Cut and Sold Statistics on National Forests 15
Table 7	Thinning and Planting on National Forests 15
Table 8	Harvest Statistics on Other Ownerships 15
Table 9	Cooperative Forestry Trends in Outputs and Dollars for Three Forest Service Programs 16
Table 10	Summary of Range Land on Other Ownerships 21
Table 11	Percent of Land Grazed by Ownership 21
Table 12	Projected State and Private Forestry — 1980 RPA Program — Pacific Northwest Region 48
Table 13	State and Private Forestry — 1980 RPA Program Display for Oregon 50
Table 14	State and Private Forestry — 1980 RPA Program Display for Washington 51
Table 15	The Relationship of the S&PF Program Elements to Regional Issues 52
Table 16	Research — 1980 RPA Program — Pacific Northwest Region 54
Table 17	Projected National Forest System Program — Pacific Northwest Region 66
Table 18	Projected National Forest System Program — Colville National Forest 67
Table 19	Projected National Forest System Program — Deschutes National Forest 68
Table 20	Projected National Forest System Program — Fremont National Forest 69
Table 21	Projected National Forest System Program — Gifford Pinchot National Forest 70
Table 22	Projected National Forest System Program — Malheur National Forest 71
Table 23	Projected National Forest System Program — Mt. Baker-Snoqualmie National Forest 72
Table 24	Projected National Forest System Program — Mt. Hood National Forest 73
Table 25	Projected National Forest System Program — Ochoco National Forest 74
Table 26	Projected National Forest System Program — Okanogan National Forest 75
Table 27	Projected National Forest System Program — Olympic National Forest 76
Table 28	Projected National Forest System Program — Rogue River National Forest 77
Table 29	Projected National Forest System Program — Siskiyou National Forest 78
Table 30	Projected National Forest System Program — Siuslaw National Forest 79
Table 31	Projected National Forest System Program — Umatilla National Forest 80
Table 32	Projected National Forest System Program — Umpqua National Forest 81
Table 33	Projected National Forest System Program — Wallowa-Whitman National Forest 82
Table 34	Projected National Forest System Program — Wenatchee National Forest 83
Table 35	Projected National Forest System Program — Willamette National Forest 84
Table 36	Projected National Forest System Program — Winema National Forest 85
Table 37	Summary of Spotted Owl Habitat Acres and Population Levels to be Tested in Forest Plans 91
Table 38	Monitoring Plan 93

List of Figures — Regional Plan

	Page
Figure 1 Location Map	4
Figure 2 Output Analysis — Pacific Northwest Region	10
Figure 3 Commercial Forest Land — Pacific Northwest Region	13
Figure 4 Projection of Regional Timber Supply and Demand for All Ownerships	17
Figure 5 Timber Capabilities for National Forests in the Pacific Northwest Region	18
Figure 6 Range Resource Targets, Forage Production Potential and Demand	22
Figure 7 Annual Wildlife Forage Production and Estimated Needs of Deer and Elk on National Forests	25
Figure 8 RPA Output Targets and Projected Demand for Hunting and Fishing on National Forests	28
Figure 9 Wilderness Capacity and Demand	35

Introduction to the Pacific Northwest Region Plan

To put the Regional Plan into proper perspective, it is important to have a general understanding of how it fits into the overall Forest Service planning process. As required by the Renewable Resources Planning Act (RPA) and related planning regulations, the Forest Service has a three-level integrated planning process consisting of:

National	RPA Assessment and Program
Regional	Regional Plan
Local	Forest Land and Resource Management Plans for the National Forests
	State Forest Resource Plans developed by the State for State and private land
	Research Plans

The planning process is characterized by a continuous cycle that must be viewed with a time perspective. Each plan has a special relationship to other plans prepared both before and after it. The RPA Program will be updated every 5 years. All other plans will be examined at least every 5 years and updated, as needed, to reflect better data, needed changes, and results of other plans. These interrelationships are described below:

RPA Assessment and Program

Every 10 years, a comprehensive national assessment is made of the forest and rangeland renewable resource situation — timber, range, water, fish, wildlife, outdoor recreation, and wilderness. Both short-range and long-range projections are made of future supply and demand for each of these resources in the RPA Assessment. The findings of the Assessment are then used to help determine the desired level of future outputs resulting from Forest Service Programs (National Forests, Research, and State and Private Forestry). Alternative levels of outputs and associated costs are examined in the RPA Program which is prepared every 5 years. Based on an analysis of these alternatives, along with consideration of public views, the Secretary of Agriculture decides upon a Recommended RPA Program for the Forest Service. The Recommended RPA Program along with a Presidential Statement of Policy are transmitted to Congress. The Congress may accept or revise the Statement of Policy. The final Policy Statement and Program serve as a guide for planning and developing future Forest Service budget proposals. However, actual program implementation is limited by annual appropriations which may or may not fully implement Forest Plans.

Locally developed plans keyed to land and resource capabilities play a key role in determining the Forest Service's capability to respond to national demands identified in the Assessment. In developing the 1980 RPA Assessment and Program, each Region analyzed its capability based on existing plans and other information available at the time (1977). Using these plans, each Region developed alternative proposals which were analyzed at the national level to arrive at the 1980 RPA Recommended Program.

Regional Planning

A primary purpose of regional planning is to help link the RPA Assessment and Program with local planning (Forest and States). By being in the middle of the planning process, regional planning serves a dual role and is done in two separate stages:

Stage 1:

The first stage is related to the development of the National RPA Assessment and Program. It involves an analysis of local plans and other available information on regional capability. Using this information, regional line officers provide input into the National RPA process. They also participate as a member of the Forest Service decision making group in developing the National RPA Assessment and Program and ultimately negotiate with the Chief for the regional share of the National Program.

Stage 2:

Once the National RPA Recommended Program is finalized, the Chief distributes to each Region their share of the National Program in terms of output targets and associated costs. At this point, the second stage of regional planning begins with the development of a Regional Plan which does three things:

- Displays the Regional RPA Program along with its distribution among the Forests and a description of State and Private Forestry and Research Programs. The RPA output targets represent each unit's share of the National 1980 RPA Program based on existing plans and other available information used to develop the RPA Program and subsequent budget proposals.
- Provides planning direction for developing Forest Plans, including the range of alternatives to be

considered. Planning direction may also result from the addressing of certain regional issues relevant to land management decisions. A test of relevancy is whether the Forests need the issue addressed at the regional level to guide their planning.

- c. Develop the Standards and Guidelines for the management of the National Forests as required by Section 6 of the National Forest Management Act of 1976 and the implementing regulations.

To put this Regional Plan into perspective, it is the means used to communicate National and Regional direction for Forest planning and pertinent information needed for State and Research planning. It must be viewed as a document prepared at this particular time after Stage 1 has been completed and is primarily based on the 1980 RPA data.

The Regional Plan will be subject to change as new and better data on biological capabilities and social, economic, and environmental effects become available through the Forest and State Planning Process.

Local Plans — Forest and State

By collecting and integrating basic data on biological potential, resource inventories, and research problems, local plans become the basic building blocks for Regional and National planning. The Forest and State Plans now being developed will play an important role in shaping the next RPA Assessment (1989) and Program (1985).

Forest Plans will include a reasonable range of alternatives, both above and below the 1980 RPA Program. One or more alternatives will be designed to meet the Forest's share of the 1980 RPA Program. Other alternatives will address the long-term goals established by Congress in the revised Statement of Policy and specific issues on the Forests. The Regional Foresters' decision on individual Forest Plans are not constrained by the RPA Program since it was primarily based on Plans existing in 1977. Rather, the emphasis in Forest planning will be on the future and how the Forest can best be used and managed to meet people's needs.

Program Development and Budgeting

The RPA Program, Regional Plans, and local plans set direction on what should be done in terms of objectives, output targets, standards and guidelines. They also include an estimated cost to implement the plans based on the best information available. However, the rate of implementation is dependent upon the amount of resources (funding and workforce) made available to the Forest Service through the annual Federal budgeting and appropriation processes.

The Program Development and Budgeting process provides an opportunity to reflect current conditions and changes that may have occurred since the RPA Program was developed. Several budget levels, all based on the RPA Program, are prepared for Regions, Research Stations, and State and Private Forestry areas. Budget proposals which depart from the Recommended RPA Program are explained and justified.

Budget proposals represent firm commitments by these units to achieve a certain level of output targets at a specified cost. Therefore, cost estimates are updated annually to reflect current conditions and the details of a specific set of project proposals (e.g., timber sales and associated road costs).

Although RPA targets and Forest Service plans serve as the basis for the initial budget proposals, they are frequently adjusted to reflect current conditions and the Administration and Congressional priorities as expressed through the appropriation process. Once Congress passes the Appropriation Act, the budget becomes a firm contract of work for which the Forest Service is held accountable. Normally, these adjustments made during the budgeting process are within the scope of Regional and Forest Plans.

Fiscal Year 1981 was the first year of the 1980 RPA 5-year Program. The distribution of Fiscal Year 1981 funds was based upon existing resource and land management plans, the best cost opportunities, local demands, local conditions, historical trends, and future outputs expected. Fiscal Year 1982 Program will be distributed in the same way, however, new information (demand and supply problems) may modify local programs. By Fiscal Year 1983, we expect new Forest Plans will play an important role in program and funding distribution.

It is important to understand that the implementation of Forest Service plans will reflect the realities of the annual Federal budgeting and appropriation processes.

Forest Service Planning is a Dynamic Process

Finally, it is important to remember that planning is a continuous process. Judgments are made on the basis of the best information available at the time plans are made. To keep the planning process viable and responsive, plans will be adjusted over time to reflect new and better data or changes in assumptions and people's needs.

Analysis of the Management Situation

Introduction

The Analysis of the Management Situation assesses the Forest Service's capability to resolve identified regional issues and concerns through its management of the National Forests, while coordinating with State and Private Forestry Programs, and Research.

The analysis presents a brief description of the overall management situation and the socio-economic characteristics of the Region. This is followed by discussion of the resource management situations as they relate to the issues and concerns.

This process uses public issues and management concerns as the central focus for the planning process and identifies those changes in management which are responsive to specific issues and concerns.

Overview of the Region

Background — Role of the Forest Service

The Forest Service is an agency of the U.S. Department of Agriculture. Forest Service responsibilities and activities are divided into four major categories: National Forest System, State and Private Forestry, Research, and Human and Community Development.

- a. National Forest System — The Forest Service is responsible for managing the National Forests and Grasslands on a multiple use-sustained yield basis, assuring that they yield commercial products such as wood, forage, water, and minerals, as well as amenities such as recreation, fish, wildlife and wilderness.
- b. State and Private Forestry — Federal forestry programs extend financial assistance and technical expertise to States and, through them, to private landowners and others. By means of these cooperative efforts, State forestry programs are supported and strengthened.
- c. Research — Supporting all forest and range activities is a comprehensive program of research that seeks to solve problems related to the protection, management, and wise use of forest and rangeland for which new knowledge and technology are needed.
- d. Human and Community Development — The primary mission of this activity is to help people and communities help themselves within the context of forest and rangeland management.

Location and Size

The Pacific Northwest Region includes the States of Oregon and Washington and portions of two counties in northern California and three counties in western Idaho (Figure 1). The Region is about 500 miles long from north to south and 380 miles wide from east to west. The total area within the Region is 105.7 million acres. The Forest Service administers 24.5 million acres comprised of 19 National Forests and one National Grassland. The Forest Service also assists in the protection and management of 20.5 million acres of other commercial forest lands through cooperative programs with State and local governments and private landowners. Forest Service research is planned and conducted by the Pacific Northwest Forest and Range Experiment Station, headquartered in Portland, Oregon.

Geography

The Region contains a great variety of land forms that reflect the result of water, volcanic or glacial events, and range from coastal dunes and flat grasslands to rolling hills and steep, highly dissected hillsides. The major geological feature in the Region is the Cascade Range which parallels the Pacific Coastline about 100 miles inland. The Coast Ranges include lower elevation mountains in close proximity to the coastline. Other important land features include the Willamette Valley and Puget Trough. One active volcano, Mt. St. Helens, is located on the Gifford Pinchot National Forest. Unstable or potentially unstable soils are extensive on all National Forests west of the Cascades and on the Wenatchee and the Malheur National Forests east of the crest of the Cascades.

Vegetation

Natural vegetation ranges from the Olympic rain forest, characterized by 200 inches of mean annual precipitation, to interior high deserts receiving less than 10 inches mean annual precipitation.

The Coast Ranges and the west slopes of the Cascade Range contain some of the best stands of large sawtimber in the United States. The east slopes of the Cascades and the lower slopes and benches of the interior mountains are covered by open pine forests and juniper. White fir/Douglas-fir associations and mixed conifer (pine, fir, cedar, Douglas-fir, larch) forests are found on the interior mountains above the pine zone and on north slopes. Grasslands and desert shrubs extend into the forests in the basins, uplands, and plains areas, where rainfall is even lighter.

Water

There are over 100,000 miles of streams and about 216,000 surface acres of lakes and reservoirs on the National Forests which provide important social and economic benefits to the Region.

Although the total water supply is abundant, distribution varies widely and seasonal flows are low in many streams in some locations. Much of the region's deep snow pack occurs on National Forests. Many communities, farms, and ranches depend upon water flowing from National Forest land.

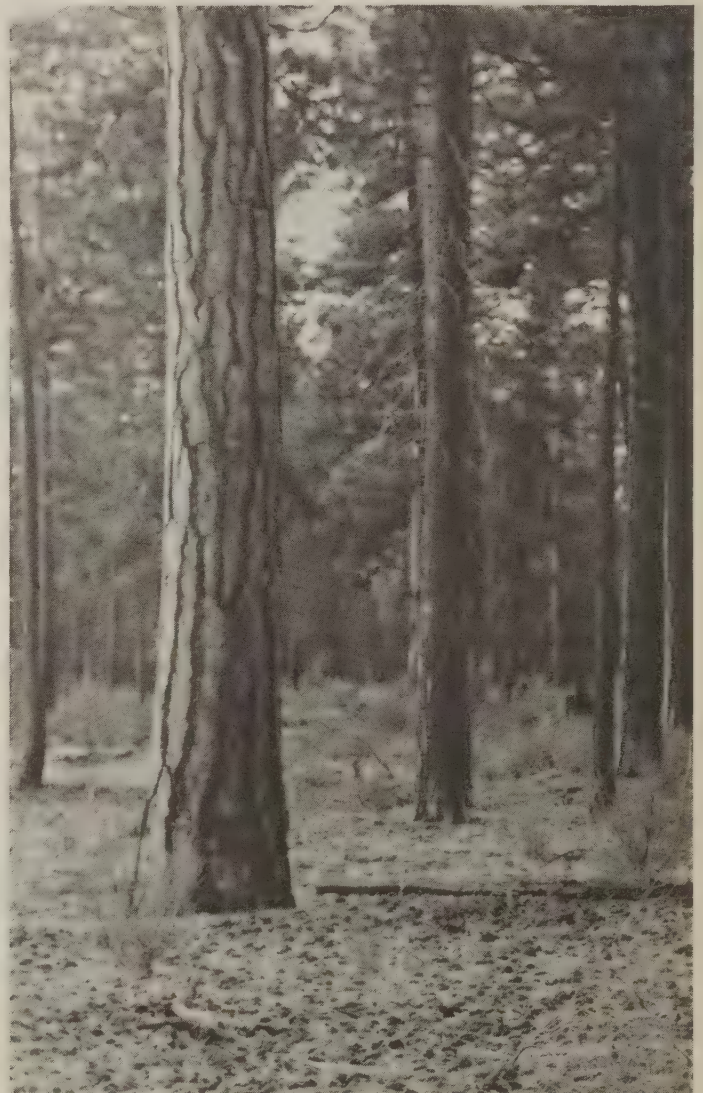
Soils

Some of the deepest, most productive forest soils occur in the lower and gentler slopes of the Cascades below 2,000-foot elevation, and in the Coast Ranges. Such soils are capable of producing 200 cubic feet (1100 board feet) per acre per year or more of wood growth from Douglas-fir and western hemlock. At mid to high elevations, the soils are frequently moderately deep, stony, and occur on steep and very steep slopes. These soils produce from 50 to 150 cubic feet (280-840 board feet) per acre per year of wood growth from Douglas-fir, hemlock, and true firs.

The Pacific Northwest Region is composed of two distinct subregions separated by the Cascade Mountain Range.



Douglas-fir subregion.



Ponderosa pine subregion.

Large acreages of soils derived from coarse textured, volcanic pumice occur in parts of the high Cascades and high plateaus and basins of south central Oregon. These areas are characterized by moderate to low productivity for ponderosa pine, lodgepole pine, and firs at the highest elevations. Wood growth on these sites ranges from 10 to 50 cubic feet per acre per year.

Soils developed from volcanic ash are common in the Blue Mountains of northeast Oregon and in northeast Washington. They usually are mixed with soils from glacial till in northeast Washington and residual and colluvial soils from basalt in the Blue Mountains. The ash soils are moderately productive, have high water storage potential, and support associated species and inland Douglas-fir. The basalt-derived soils in the Blue Mountains usually are medium to fine textured and shallow to moderately deep with ponderosa pine as the dominant tree vegetation. Wood growth on these soils range from 10 to 110 cubic feet per acre per year.

Climate

The Cascade Range exerts significant influence over the climate of the Pacific Northwest. It serves as a barrier to precipitation by reducing precipitation originating off the Pacific coast before it can reach central and eastern Washington and Oregon. Generally, the Region has distinctly wet winters and dry summers; but the areas west of the Cascades have more moderate temperatures and longer, cooler growing season because of proximity to the Pacific Ocean.

Forests on the west side of the Cascades, notably the Siskiyou and Siuslaw, have serious storm and flood hazards. Storms producing mass movement of soil typically occur every 4 to 7 years at a given location and are characteristically of long duration, low intensity, and occur during the winter months.

East of the Cascades, storm/flood problems are less common than on the west side. Erosion and flooding, however, can result either from rain-on-snow events or from summer thunderstorms.

Economy

The primary centers of growth and diversification are in

the Puget Sound-Seattle, Spokane, and Willamette Valley-Portland metropolitan areas. There are many commodities and services for which the area is not self-sufficient and is still "catching up" to the rest of the Nation in many of the rapidly growing businesses such as electronics and services.

The Pacific Northwest has historically been a major exporter of timber, agricultural products, and fish. While economic diversification is occurring in the region, timber and agricultural products are expected to continue to play a significant role in the economic base.

Forest Products are important to all levels of the regional economy. Approximately 44 percent of Oregon's economy and 28 percent of Washington's are directly dependent upon forest resources. Changes in the national demand for Forest products produce significant changes in the employment pattern in Oregon and Washington. This relationship is expected to continue into the future.

Projections published by the Bureau of Economic Analysis, U.S. Department of Commerce (Office of Business Economics, Department of Commerce, Research Service, Department of Agriculture, [OBERS])¹ indicate that both Oregon and Washington will experience continuing population growth at the rate of 6 to 7 percent per decade, growth in total employment at about 9 to 10 percent, and income of about 50 percent. Despite the rapid growth in personal income, per capita income in Oregon is projected to remain below the national average and increase only slightly. In Washington it is projected to remain above the national average but recede slightly.

¹"OBERS" projections were selected because they are national projections, which facilitate comparisons of regional, inter-regional and National population growth.

Population

The population of Oregon and Washington lives predominately in urban places (70 percent) and in metropolitan counties (62 percent). Seventy percent are concentrated in the narrow strip of counties crossed by Interstate Highway I-5; most of the remaining 30 percent live along the coast and east of the Cascades.



Seventy percent of the Pacific Northwest's population lives in urban areas.

The population has grown 22.3 percent between 1970 and 1980. Population growth and in-migration are significant themes in the two States. The bulk of population growth is occurring where people already are — in the I-5 corridor. The current national trend for population growth in accessible, nonmetropolitan counties is certainly evidenced in Oregon and Washington, and will continue.

These population trends, and the changing social values and preferred lifestyles which cause them, have significant implications for the kinds of uses and constraints that people will prefer for management of the National Forests in the Region.

The effects of those values and lifestyles, and resultant population growth include:

- increased residential use of land adjacent to many National Forests, with increased pressure to manage adjacent or visible Forest land for amenities instead of for a commodity emphasis;
- an increased public concern with environmental qualities (air, water, chemicals, noise) on a daily, local basis; and the attendant management problems of adjacent residential and Forest uses (fire, harvest, etc.);
- a general increased preference for forest land amenities, such as unregulated, unstructured recreation, even when in conflict with economic growth;

- increased use of Forest resources for personal "semi-market" goods, (firewood, fish and game, other food, building materials); and

- an increasing demand for marketable Forest outputs for construction and domestic use, buttressed by the increased appreciation of these items for their "naturalness."

Minorities

Racial and cultural minorities were a small segment of the two States' population in 1980. Blacks comprised 2 percent and American Indians formed 1 percent of the States' population. 2 percent of the States's people were Hispanic. Blacks in the region were predominately urban; while American Indians and Hispanic people were more rural than the States' overall population. Indian Reservations bordering National Forests necessitate coordinated land management.

Overview of Management Direction and Capability

Management direction has many dimensions. Laws, policies, programs, budgets and many other factors contribute to the total management direction.

The extent of any needed changes in management direction is normally limited to that which is physically possible within the existing natural resource base. Resource inventories were reviewed to help determine measures of the possibilities for change within the physical natural resources of the National Forests in the Region. This review was limited to inventory features related to the issues and concerns identified for resolution in this Regional Plan. The results show that the Region presently contains the following:

Inventory Features	Thousands of Acres*
Reserved and deferred**	3,724
Productive forest land***	16,274
Presently undeveloped (roadless)	4,078
Further planning	621
High risk soils	4,774
Retention, for visual management	3,505
Partial Retention	7,122
Threatened and endangered species habitat	443
Big-game winter range	4,309
Old-growth timber	3,889

*Acres do not total to National Forest inventory because many features are found on the same acres.

**Includes Research Natural Areas.

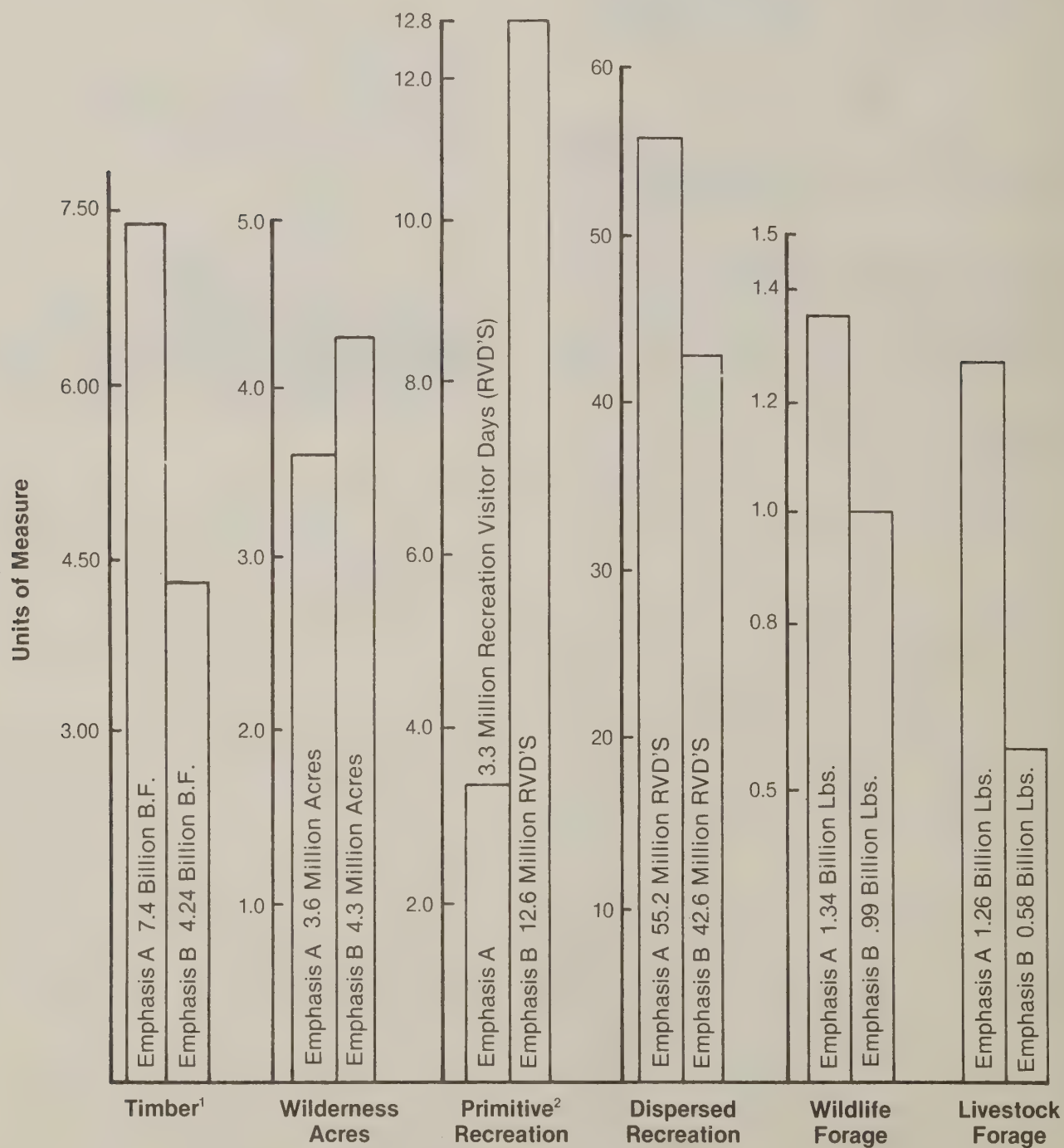
***Excludes Productive Reserved and Deferred Acres.

Capability. Of particular interest in the Region is the upper limit of wood production and grazing capability physically possible from the National Forests. These resources are considered by some to be commodity or “market” resources that have a well-established market place value. Outdoor recreation, wilderness, and wildlife habitat on the other hand can be considered “nonmarket” resources that do not have a well established and defined market place value.

Using assumptions appropriate to emphasize production of one or the other of these two resource types, outputs were calculated for timber, wilderness, primitive recreation, dispersed recreation, wildlife, and livestock forage.

To define the range of output capability, it is necessary to make some assumptions about how land can be used to produce goods and services. This range is bracketed by two sets of assumptions: one reflects management emphasis on market valued resources; the other set reflects an emphasis on nonmarket resources. These assumptions are listed below as Emphasis “A” and Emphasis “B”, respectively, and the range of outputs is shown in Figure 2.

**Figure 2 Range of Resource Outputs
Reflecting Management Emphasis
Pacific Northwest Region for the Year 2030**



¹Includes chargeable and nonchargeable volumes

²Includes recreation available from wilderness and roadless areas

General Assumptions for Emphasis A, Market Resource

1. All productive Forest land is available for intensive management directed primarily at the production of wood fiber except:
 - a. Those acres of productive Forest land reserved and deferred;
 - b. Those acres of productive Forest land identified as Threatened and Endangered Species Habitat.
2. Yields will be based upon a high investment intensity of management for timber which also results in high outputs of grazing forage and certain types of dispersed recreation.
3. All other acres are available, first, for the highest forage producing management prescriptions, and second for the highest recreation producing management prescriptions. RARE II further planning areas are assumed to be available for nonwilderness uses.

General Assumptions for Emphasis B, Nonmarket Resources

1. RARE II further planning areas are assumed to be available for wilderness management.
2. Priority is given to managing acres for soil stability, visual resources, old growth timber, primitive recreation, wildlife habitat, and dispersed recreation.

Management Situations and Assessments — National Forest System

This section describes the Pacific Northwest Region's current management situation by resources and programs. It also assesses the Region's capabilities and opportunities to address public issues and management concerns. The following management situations are discussed: Timber, Range, Fish and Wildlife, Watershed, Recreation, Cultural, Minerals and Rock Resources, Energy, Fire Management, Air Quality, Lands — Intermingled Ownerships, and Human Resources.

Timber

Description

National Forest System. The National Forests of the Region, along with forest lands of other ownerships, are among the most productive in the world. Approximately 90 percent of the National Forest lands in the Region are forested. About 76 percent of the forested land base (18,586,400 acres) has a productivity equaling or exceeding 20 cubic feet per acre per year. Approximately 85 percent of this acreage is currently available for regulated timber management and represents approximately 65 percent of the total National Forest land in the Pacific Northwest Region. Table 1 illustrates this relationship.

Table 1 — Timber Land Classification Summary
Pacific Northwest Region

	Thousands of acres
Total National Forest Land	24,455.1
Non-forest and water	2,450.6
Forested land	22,004.5
Unproductive (productivity less than 20 cuft/acre yr)	3,418.1
Productive (productivity more than 20 cuft/acre yr)	18,586.4
Reserved and deferred ¹	2,065.9
Commercial forest land	16,520.5
Unregulated	580.2
Regulated	15,940.3
Standard	10,609.4
Special	2,865.9
Marginal	2,465.0

¹ See Glossary for definitions.

Source: TIMAS computer files — USDA, Forest Service
— Pacific Northwest Region — existing classification.

The National Forests of the Pacific Northwest Region contain extensive stands of softwood timber which are nationally significant. The Region contains 38 percent of the entire softwood volume of the National Forest System. The volume is summarized in Table 2.

**Table 2 – Standing Inventory – Softwood Sawtimber on Commercial Forest Land
National Forests – Pacific Northwest Region**

Diameter class (inches)	Douglas-fir subregion (millions of bd. ft.)		Ponderosa pine subregion (millions of bd. ft.)		Totals	%
		%		%		
9.0-16.9	59,511	22	48,654	42	108,165	28
17.0-28.0	75,742	28	45,179	39	120,921	31
29 +	135,255	50	22,011	19	157,266	41
TOTALS	270,508	100	115,844	100	386,352	100

Source: Developed from tables in Forest Statistics of the U.S., 1977, USDA, Forest Service.
Volumes based on international 1/4" scale.

The Douglas-fir subregion includes lands west of the summit of the Cascades and the ponderosa pine subregion includes lands to the east. The two subregions differ markedly in their timber productivity, with the Douglas-fir subregion being the more productive. For example, 43 percent of the Douglas-fir subregion is in the 120 + cubic foot per acre per year productivity class, although only 7 percent of the ponderosa pine subregion is in this class. While the ponderosa pine subregion is less productive, it is still valuable timber producing land, upon which local industry and communities are highly dependent.



The forest lands of the Pacific Northwest Region produce a significant share of the nation's timber output.

Table 3 summarizes commercial forest land productivity of National Forests in terms of cubic foot/acre/year growth potential.

**Table 3 – Timber Productivity – Commercial Forest Lands
National Forests – Pacific Northwest Region**

Productivity class cu ft/ac/yr	Douglas-fir subregion Thousand Acres		Ponderosa pine subregion Thousand Acres		Total region Thousand Acres	%
		%		%		
120 +	2,825	43	655	7	3,480	21
85-119	1,552	23	2,148	22	3,700	22
50-84	1,991	30	5,399	55	7,390	45
20-49	290	4	1,660	16	1,950	12
	6,658	100	9,862	100	16,520	100

Source: Based on TIMAS 4-80 Forest Statistics of U.S., 1977, USDA Forest Service

The two subregions cross State boundaries and are summarized by States in Figure 3.

Other Ownerships. Other public and private ownerships constitute 61 percent of commercial forest land in the Region. (See Figure 3).

Figure 3 Commercial Forest Land by Ownership

Ownership of Oregon's Commercial Forest Land
Total: 24,169,725 Acres, 1977.

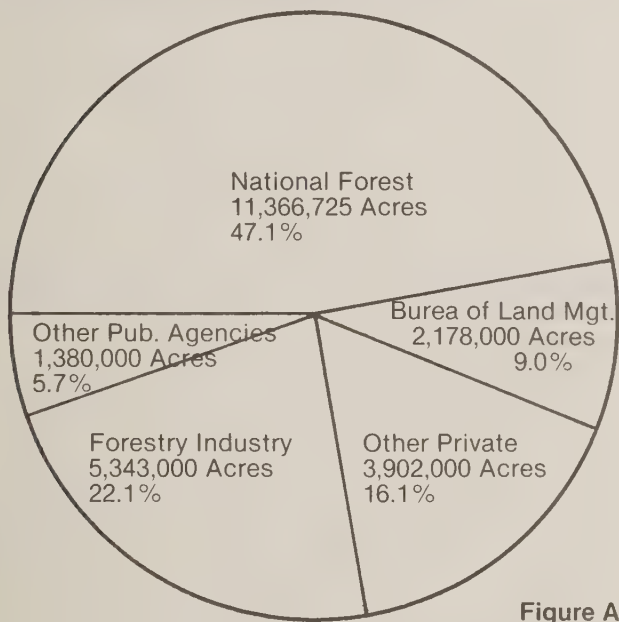


Figure A

Ownership of Washington's Commercial Forest Land
Total: 17,911,134 Acres, 1977.

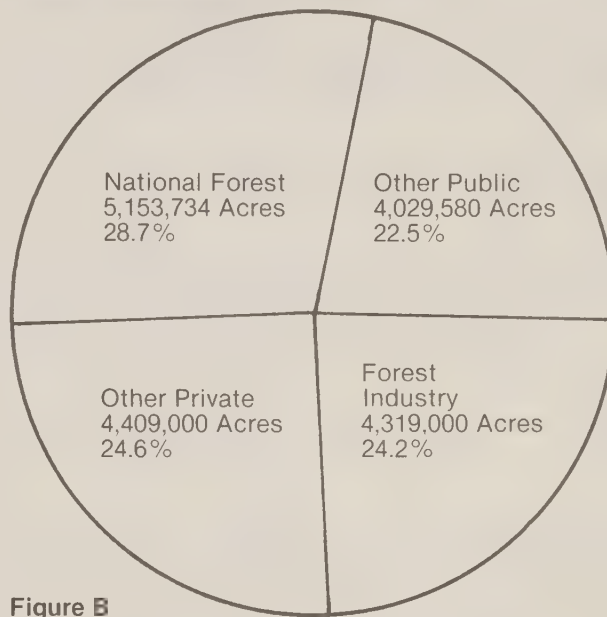
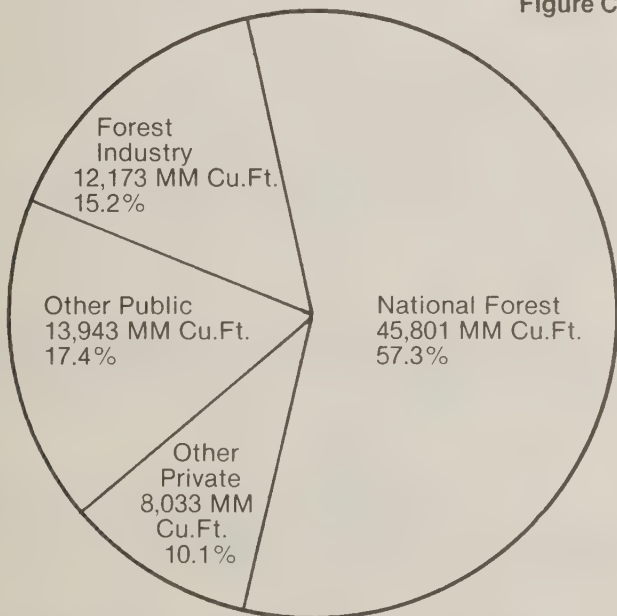


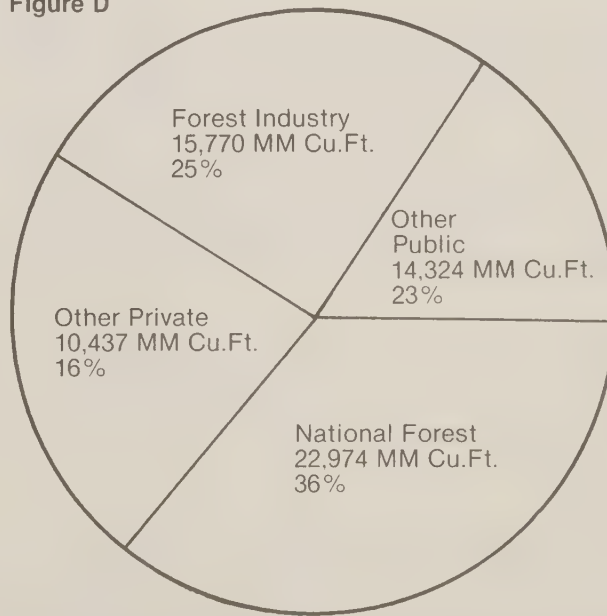
Figure B

Figure C



Volume of Growing stock on Commercial Forest Land by Ownership, Oregon, 1977.

Figure D



Volume of Growing stock on Commercial Forest Land by Ownership, Washington, 1977.

Figures A and C based upon draft Oregon Forest Productivity Study Report, August 3, 1979

Figures B and D based upon draft Washington Forest Productivity Study Report, July 2, 1979

Although industrial and nonindustrial private land holdings are extensive, their management objectives differ dramatically. Generally, industrial holdings are managed primarily for timber production. Currently only about 20 percent of the nonindustrial private forest lands are managed for continuous timber production. The remaining 80 percent are managed for a variety of objectives, and timber may be harvested occasionally or not at all.

The softwood volume of these lands is displayed in Table 4.

**Table 4 – Standing Inventory – Softwood Saw Timber on Commercial Forest Land
Other Public and Private Ownerships, Oregon and Washington (Local Scale)**

Diameter class (inches)	Douglas-fir subregion (millions of bd. ft.)	%	Ponderosa pine subregion (millions of bd. ft.)	%	Totals (millions of bd. ft.)	%
9.0-16.9	43,296	39	16,229	25	59,525	18
17.0-28.0	109,921	40	32,415	49	142,336	42
29 +	120,229	21	16,944	26	137,173	40
TOTALS	273,446	100	65,588	100	339,034	100

Source: Developed from tables in Forest Statistics of the U.S., 1977, USDA, Forest Service.

The Commercial forest lands in both industrial and nonindustrial private ownerships are generally of higher site quality than National Forest lands. Roughly 55 percent of industrial ownerships contains timberland capable of producing more than 120 cubic feet per acre per year, while 44 percent of farm and miscellaneous private holdings contain forest land of this quality. A significant acreage of forest land is converted to nonforest uses each year.

Threats and Hazards

The timber supply from the forests of the Pacific Northwest is subject to loss from wildfire, floods, severe wind or ice storms, insects and disease, land slides, and avalanches.

Fire. The average area burned annually by wildfire from 1970 to 1979 was 25,322 acres on National Forests and 19,015 acres on State protected lands. Factors which tend to increase risk of wildfires include: increasing accumulations of highly flammable forest debris; unusually severe and prolonged dry lightning storms; and increasing use of the Forest lands by people. Factors which tend to reduce the risk of wildfire include: treatment of forest residues through utilization for forest products (pulp and fiber products,

fence posts, shingles and shakes, etc.), fuelwood, energy generation, and disposal of debris accumulation through prescribed burning.

Insects and Disease. Insects and disease are estimated to cause losses of about 335 million cubic feet each year on the National Forests. A comparison of losses by State and ownership are shown in Table 5.

Table 5 – Annual Growing Stock Losses From Insects & Diseases

Land ownership/mgt.	Total Growing Stock million cu. ft.	Annual Loss in		Annual Loss Percent
		million cu. ft.	million cu. ft.	
National Forest	67,737	224.1	110.3	.49%
Other Federal	25,869	61.9	41.1	.40%
State & private	38,923	147.5	142.4	.75%
Total	132,529	433.5	293.8	.55%

These losses appear somewhat minor when compared to total growing stock. When compared to the average annual harvest of approximately one billion cubic feet for the last five years from the National Forests of the Region, this loss becomes more significant. This is coupled with the fact that disease losses are distributed generally throughout the Region, but insect losses occur primarily on the east side of the Cascades. A defoliator or bark beetle outbreak can have severe impact on an individual forest or area.

Although some of these losses are economically salvageable for production of lumber or other forest products, a large proportion are not. Gains can be made through prevention measures such as discussed later under Opportunities.

Output, Demand, and Capability

Output. The trend on National Forest lands in the recent past (1975-1979) shows a general increase in both sales and harvest as indicated by the data in Table 6. It is also interesting to note that the cut has been less than the volume sold for each of the past 5 years. As of September 30, 1979, approximately 13.3 billion board feet of uncut volume was under contract. This is equal to approximately 2.9 times the average annual sales as shown in Table 6.

Table 6 – Cut and Sold Statistics – Pacific Northwest Region – National Forests

	Millions of board feet (MMBF)				
	1975	1976	1977	1978	1979
Oregon					
NF Sold	3,423	3,485	3,412	3,498	3,556
NF Cut	2,740	2,966	3,109	3,184	3,258
Washington					
NF Sold	1,440	1,357	1,353	1,490	1,590
NF Cut	1,252	984	1,234	1,157	1,271
Region					
Sold	4,863	4,842	4,765	4,988	5,146
Cut	3,992	3,950	4,343	4,341	4,529

Commensurate with the Region's activities in harvesting, the reforestation and precommercial thinning program shows a similar general overall increase but varies more annually due to available funding, weather, contracting, and site readiness. These activities are reflected in Table 7 and show the trends on National Forests.

Table 7 – Thinning and Planting on National Forest Lands – Pacific Northwest Region

	Acres by year				
	1975	1976	1977	1978	1979
Planting					
K-V ¹	73,489	72,599	62,658	85,175	76,983
P&M ²	19,760	23,558	21,060	32,901	32,021
Total	93,249	96,157	83,718	118,076	109,004
Thinning					
K-V	29,881	30,934	23,276	22,094	26,642
P&M	42,507	40,030	25,454	40,949	35,687
Total	72,388	70,964	48,730	63,043	62,329

¹ Knutsen-Vandenburg funds

² Protection and maintenance funds

The trend in harvest on other ownerships has shown increases as reflected in Table 8.

Table 8 – Harvest Statistics – On Other Ownerships – Oregon & Washington

	(MM bd. ft. Scribner, local scale)				
	1975	1976	1977	1978	1979
Oregon					
Other					
public	928	1,417	1,374	1,685	1,908
private	3,781	3,561	3,976	3,784	3,881
Total	4,709	4,978	5,350	5,469	5,789
Washington					
Other					
public	1,025	1,342	1,352	1,485	1,649
private	4,062	4,414	4,067	4,036	4,038
Total	5,087	5,756	5,419	5,521	5,687

Reforestation, timber stand improvement, and forest product utilization (FPU) programs are very active and will contribute significantly to future supply and, in the case of FPU, extend the timber resource.

In Oregon and Washington, Forest Service cooperative

programs focus on future wood supply and make only a minor, direct contribution to volume currently sold from State and private lands (see Table 9). One reason for this is that "old growth" is essentially gone from these ownerships. A high percentage of State and private lands contain young stands.

Table 9 — Cooperative Forestry Trends in Outputs and Dollars for Three Forest Service Programs

Program	1975 ¹			1978			1981		
	Quantity	Units	Dollars thousands	Quantity	Units	Dollars thousands	Quantity	Units	Dollars thousands
Forest product utilization	2,120	million cu. ft.	86.4	21,168	million cu. ft.	183	25,000	million cu. ft.	282
Timber stand improvement	4,088	acres	199	7,183	acres	196	6,638	acres	344
Reforestation	4,059	acres	319.2	6,841	acres	528	6,777	acres	674

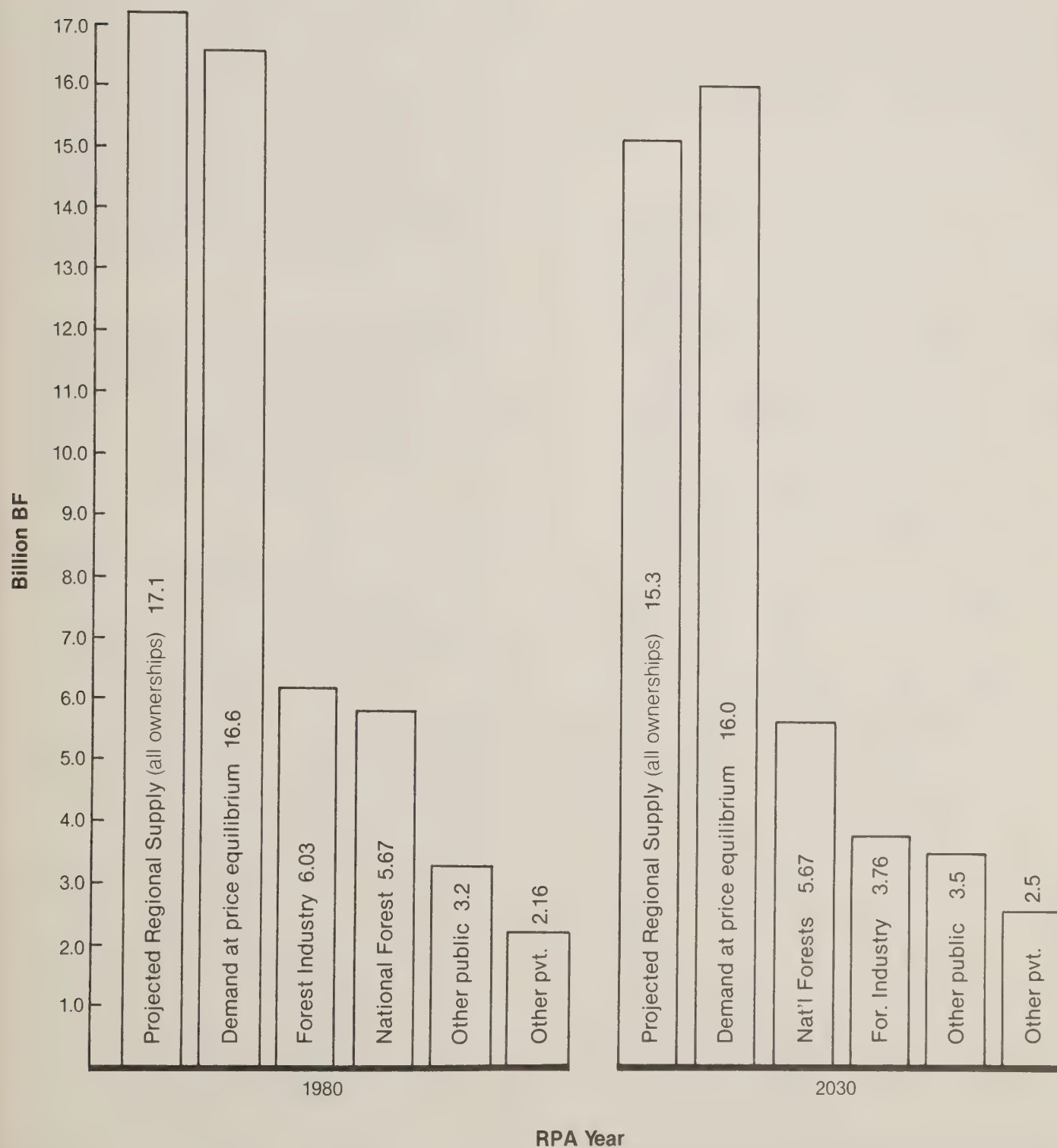
¹ All values expressed in constant 1978 dollars.

Demand. Estimating the regional/local level of demand for stumpage requires that potential national demand levels be linked with regional/local supply possibilities. This is accomplished by seeking the points where national market prices are equated with local production costs (including transfer costs to markets). This method was used in "An Assessment of Forest and Range Land Situation in the United States." Based upon this method, the quantity demanded at equilibrium prices in the Pacific Northwest in 2000 will be only slightly greater (about 1 percent) than the quantity supplied in 1976. To achieve this equilibrium, stumpage prices would rise dramatically, twofold to threefold over 1976 price levels by 2000.

Figure 4 displays an estimate of physical supply for the Region in 1980 and 2030. For the Region, the total supply of 17.1 billion board feet is slightly higher than the 1980 demand of 16.6 billion board feet. This figure also shows the contribution of individual ownerships for 1980-2030. By 2030, a supply of 15.3 billion board feet is projected whereas the demand is projected to be 16.0 billion board feet. This shows that supply will be reduced below the demand level.

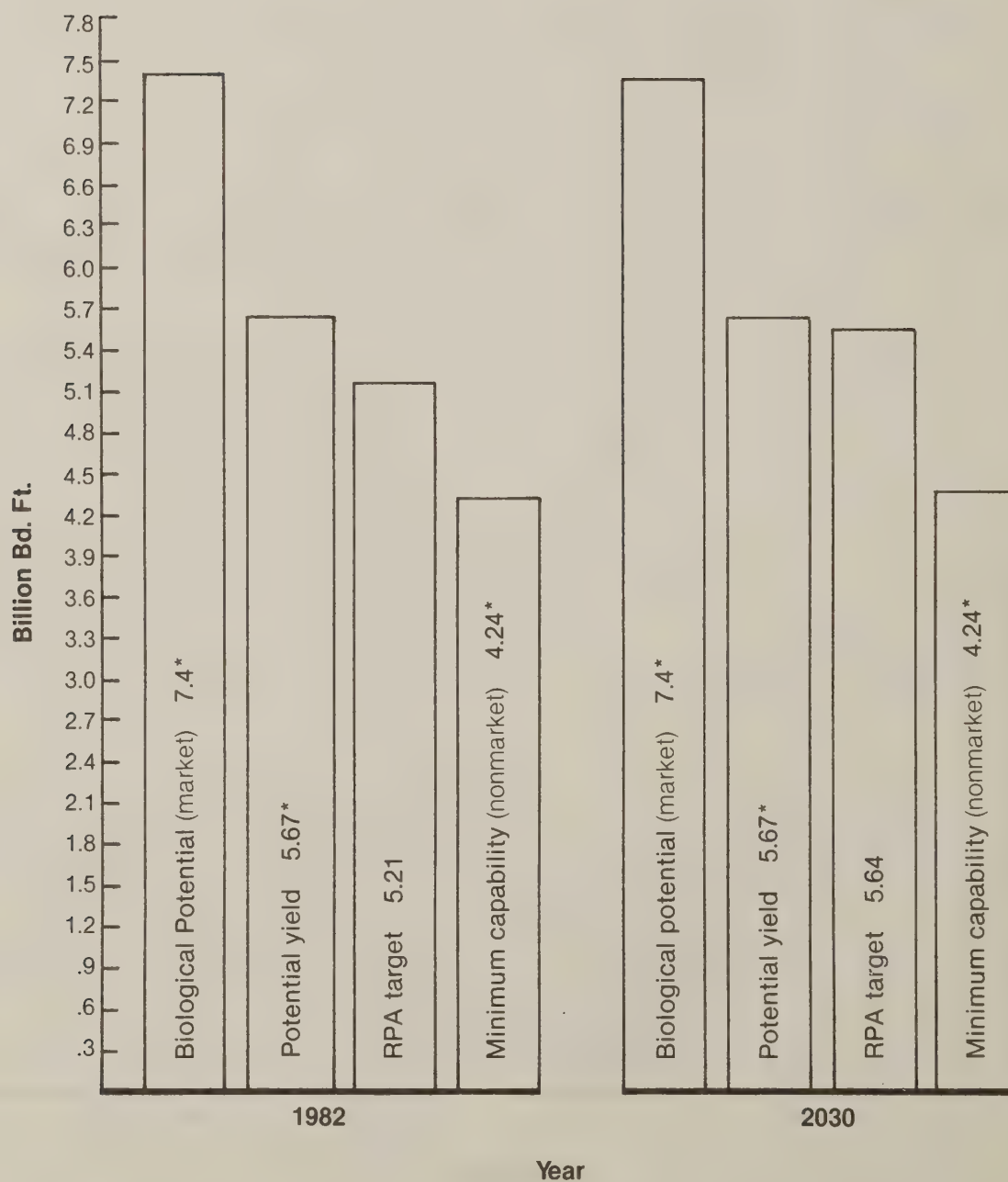
Capability. Figure 5 displays biological potential, current potential yields, projected RPA targets, and minimum capability for National Forest timber. Based on projections of current timber management plans, the National Forests have the capacity to meet 1982 RPA targets of 5.21 billion board feet, and by 2030, the Regional potential would slightly exceed the RPA projected goals of 5.64 billion board feet.

Figure 4 Projection of Regional Timber Supply and Demand for All Ownerships



Source: Gedney, Oswald and Fight, Two Projections of Timber Supply in the Pacific Coast States, PNW-60, 1975.

Figure 5 **Timber Capabilities for National Forests in the Pacific Northwest Region**



*Includes 300 MMBF of nonchargeable volume for comparability to RPA volumes

Relevant Issues

The National Forests in the Region contain a significant proportion of the commercial forest land and standing timber volumes; are a principal location for wildlife habitats, fisheries, and recreational pursuits; contain the headwaters for most of the major river systems in the Region; and contain the watersheds for many power and irrigation impoundments and domestic water sources. In the years following World War II, demands for National Forest timber rapidly increased. Road construction increased rapidly, principally as a prerequisite for timber harvest; but the improved access also helped to generate and serve a rapid increase in use of these lands for all forms of forest recreation.

As management activities and public use intensified and spread over the National Forests, conflicts between major types of uses proliferated; and the current issues and management concerns which drive this planning process resulted. The existing situation is that demand for the various goods and services is nearing the biological and physical capability of the land as it is now being managed.

The primary issues concerning timber management in the Pacific Northwest Region are:

- a. Timber supply from National Forests in relation to predicted downward supply trends on other ownerships in both the short- and long-term;
- b. Conflicts between timber, range and wildlife habitat management objectives;
- c. Potentials for adverse impacts on environmental quality as increases occur in use of chemicals on forested lands. The Forest Service needs to cope with the increasing restraints on the use of man-made chemicals for such purposes as vegetation manipulation, forest insect and disease control, wildfire suppression, forest fertilization, and maintenance of transportation and energy transmission rights-of-way;
- d. The Forest Service needs to meet current and future responsibilities to protect and improve soil productivity;
- e. The level and types of timber harvest and their effects on other resources or uses such as outdoor recreation, municipal water supply, threatened and endangered species and anadromous fish habitat;
- f. The need for Regional standards to determine suitability and capability for growth; and
- g. The Forest Service needs to evaluate whether or not the National Forest commercial forest land base should be reduced through the exchange process.

Contributing to the timber supply issue in meeting short-term targets (next 5 to 8 years) is that future program targets will be dependent upon the Forest Services' ability to provide access, prepare, sell, and administer an increasing amount of projected sale programs in many of those areas allocated to non-Wilderness use by the RARE II process. Since the initiation of roadless area reviews of the RARE I process, the Forest Service has been harvesting the full allowable harvest level from presently developed areas.

This required concentration of harvest on only a portion of the commercial land base used to calculate the allowable harvest level has caused:

- a. Higher mitigation costs than projected for a normally dispersed sale program over the entire commercial land base;
- b. Greater adverse resource impacts than would have been experienced with normal dispersion of sales in time and space;
- c. Less than the full silvicultural treatment needed and warranted in some stands due to proximity to other sale openings. This proximity frequently created a necessity to provide less than ideal silvicultural treatments to assure maintenance of planned cover/forage ratios or to meet hydrologic or sedimentation rate limitation for the watersheds; and
- d. Loss of opportunity to salvage insect and disease losses in the undeveloped areas and the subsequent wildfire risks created by the dead and dying timber.

Another concern is the determination of which investments in intensive timber management practices are appropriate over the planning period. Resolution of this concern will require consideration of land suitability, and the cost-effectiveness of the intensive practices proposed. Budget preparation must consider front-end investments needed to meet future RPA needs and must also include supporting activities.

To determine the appropriate level of timber harvest and the types of harvest practices and systems to be used during the planning period, it will be necessary to consider:

- a. Road and landing construction techniques that minimize soil disturbance and maintenance;
- b. Timber harvest techniques that minimize soil movement and productivity;
- c. The effect of smoke from slash burning on air quality standards;
- d. How to provide anadromous fisheries, wildlife habitats, and threatened and endangered species while maintaining productivity;
- e. The use of controversial chemicals; and

- f. Methods to protect water quality in municipal watersheds.

Limiting Factors

All of the previous projections assume that the land available for wood production remains stable and that adjustments in commercial forest land would be minor and compensating. Ability to meet RPA targets in the current program or in future program updates is dependent upon the amount of land available, the management constraints applied to that land and the level of investment in forest management.

The projected outputs from the National Forests assume intensive timber management. There are two key points that must be considered: (1) intensive practices must be used to sustain levels currently projected, and (2) intensive timber management requires large front-end investments to get the growth needed for later gains.

The assignment of operating budgets will be of prime importance in the short range and must be considered in all planning. Assurance is needed that investments are made on the most economic sites available.

Even if the available commercial forest land base remains relatively stable, effects of ever-increasing constraints of laws, regulations, programs, and other resources will shape and limit the ability of the Forest to meet the RPA timber targets. One of the most important aspects of the forest planning process is the recognition that land base is also needed for other resources, goods, and services.

Opportunities

The following opportunities for resource use and development are identified:

1. To increase timber outputs from the regulated commercial forest land base by:
 - a. Improved scheduling, timing, and distribution of harvest activities to serve timber production and other resource needs;
 - b. Modification of the mixture of even- and uneven-aged silvicultural systems that are planned in multiple resource management areas;
 - c. Providing direction, training, monitoring systems, and budgets that will insure that sale planning and layout is done with competent application of the best technology for logging, road, and related transportation system requirements; and
 - d. Reviewing current allocations to see where goals for all resources can be satisfied by intensifying timber management practices on best economic sites.

2. Provide access for economically viable salvage and intermediate entry opportunities through appropriate use of forest road and trail funds.
3. To encourage the use of biomass for energy production, concentrating on the co-generation approach where such energy production would serve wood utilization facilities.
4. To reduce loss of usable forest material from fire, insects and disease on both regulated and unregulated lands by:
 - a. Accelerating harvest from susceptible live/green stands (may involve use of the departure from nondeclining even flow provision in NFMA);
 - b. Thinning in susceptible live/green stands;
 - c. Tree species selection through harvest and reforestation programs;
 - d. Selection of logging systems to minimize damage to residual stands; and
 - e. Selection of disease resistant trees (e.g., blister rust).
5. To investigate the feasibility and need for departures from nondeclining even flow to shift timber targets between individual forests or groups of forests in order to:
 - a. Improve the Regional economic efficiency of timber production by concentrating timber production on the most economical productive sites; and
 - b. Alleviate the predicted reduction in availability of timber from other land ownerships.
6. To optimize cooperative programs in forest products utilization, timber stand improvement, forest pest management and reforestation on private lands.
7. To work with States and counties in planning a stable commercial forest land base.

Range

Description

National Forest System. The Pacific Northwest Region has provided forage for domestic livestock since the late 1800's, long before the National Forests were reserved from the public domain. This forage resource has enabled many livestock owners to maintain balanced yearlong ranching operations. These rangelands historically have also provided forage and habitat for many important wildlife species. The demand for greater wildlife populations for some species is increasing. The National Forest System ranges will remain an integral part of the wildlife production in the Region.



Forage for domestic livestock has been furnished by the forests of the Pacific Northwest Region since the early 1900's.

Over 80 percent of the National Forest grazing lands in the Region are forested. The Region has a total of 7,860,000 acres in range allotments, with 6,300,000 in Oregon and 1,560,000 in Washington. Most of these lands are in satisfactory range condition, although some areas still receive excessive use. There is a need to plan and implement specific grazing management systems to alleviate excessive use and to balance livestock and wildlife needs with the forage supply and timber regeneration needs.

Other Ownerships. The following tables summarize acres of forest and range land in other Federal and non-Federal ownerships in the Region and show the percent of land grazed by ownership.

Table 10 – Summary of Forest and Range Land on Other Ownerships

	Forest Land (Thousand Acres)		Range Land (Thousand Acres)	
	Other Federal	Non- federal	Other Federal	Non- federal
Oregon	4,938.0	11,112.1	11,312.7	9,186.9
Washington	1,050.3	24,818.8	1,019.7	6,227.4
Total	5,988.3	35,930.9	12,332.4	15,414.3

Table 11 – Percent of Land Grazed by Ownership

	Other Federal	Non- federal
Oregon	79	70
Washington	38	58

Source for Tables 10 and 11: "An Assessment of the Forest and Range Land Situation in the United States", USDA, Forest Service, 1980, "The Nations Range Resources, A Forest-Range Environmental Study", USDA, Forest Service, Forest Resource Report No. 19, Dec. 1972.

Threats and Hazards

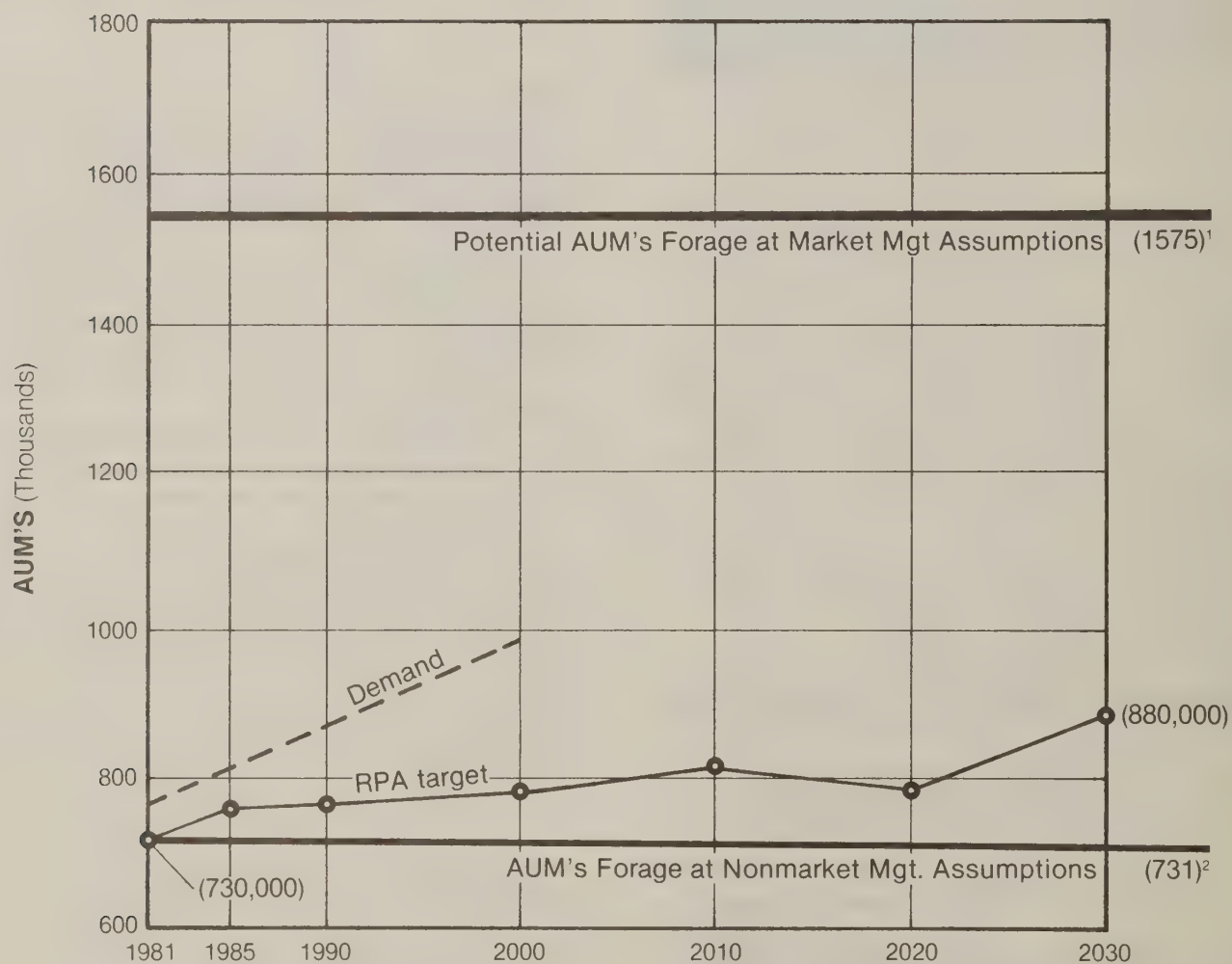
Threats and hazards to the range resource are noxious weeds, insects such as epidemic grasshopper populations, and in some cases, fire. These are infrequent and do not have overwhelming negative impacts on National Forest ranges. Competition for forage by increasing elk populations could threaten the range resource if elk populations are not properly managed.

Outputs, Demand, and Capability

Nearly 125,000 cattle and 88,000 sheep are permitted to use 713,000 animal unit months of forage each year on 900 National Forest range allotments.

The National Forest ranges provide 1.5 billion pounds of forage for livestock and wildlife on established range allotments. There is potential for additional forage use by livestock outside of existing range allotments, particularly on lower slope timber lands west of the Cascades as transitory range. Figure 6 displays the potential output level (market) and low-level "non-market" output.

Figure 6 Range Resource Targets, Forage Production Potential, and Demand, Expressed in Animal Unit Months (AUM'S)



(54%) Forested range eastside (856.6M AUM'S)
 (12%) Nonforested range eastside (179.5M AUM'S)
 (33%) Forested range westside (516.6M AUM'S)
 (1%) Nonforested range westside (22.5M AUM'S)
 (61%) Forested range eastside (448.8M AUM'S)
 (23%) Nonforested range eastside (165.0M AUM'S)
 (13%) Forested range westside (94.2M AUM'S)
 (3%) Nonforested range westside (22.5M AUM'S)

The projected demand is displayed between these two levels. The 1981 RPA target is below the low-level (non-market) output and demand. The RPA target for 2030 is well below the "market" potential. Much of this increase, however, is based on anticipated use by sheep of transitory range created by timber harvest on National Forests.

The demand for range grazing is derived from the demand for livestock products, particularly meat and wool. Historically, per capita consumption of beef has been rising and per capita consumption of lamb has been falling. Although per capita consumption of beef has declined in recent years, rising population levels will sustain a strong future demand for range grazing. The demand for range grazing at the national level is projected to increase to about 41 percent above 1976 levels by 2000. The projected demand in the Pacific Northwest is about 50 percent for this same period. In many areas of the West, including the Pacific Northwest, Federal range may be a critical component in meeting this demand. Increasing costs are reducing feedlot opportunities and creating additional demand for natural range forage.

Relevant Issues

Conflicts Between Timber and Range Management and Wildlife Habitat Management. Timber harvest patterns affect changes in wildlife food and cover as well as distribution and travel relationships for both wildlife and livestock. Increasing elk numbers in northeastern Oregon and southeastern Washington are competing with permitted livestock for forage on some specific areas during certain times of the year. Consequently, local areas are receiving excessive utilization where this forage competition occurs.

Riparian Areas. Some riparian areas east of the Cascade Range in the Region have been used excessively by livestock. The concentration of livestock use has reduced water quality, damaged streamside vegetation, degraded fish habitat, and reduced overall site productivity of these areas.

Threatened and Endangered Species. Livestock must be managed to insure perpetuation of the threatened and endangered plant and animal species.

Limiting Factors

a. Many people have the mistaken belief that grazing, even when properly managed, is not compatible with wildlife, riparian areas, and timber regeneration.

- b. The increasing and conflicting demands by the public for both market and non-market commodities or values.
- c. The funding necessary to implement and monitor high-quality resource management programs that will bring RPA targets and land capability closer together.
- d. The failure to recognize the multiple use benefits associated with range resource management beyond just grazing fee receipts.
- e. The inability of market conditions to maintain a sheep industry to capitalize on the Region's timbered range opportunities, particularly west of the Cascade Range where abundant transitory range is created by timber harvest.
- f. There is a shortage of on-the-ground, range management expertise.
- g. The potential for grazing to damage young trees on timber harvest areas before the stands are well established.

Opportunities

- a. There is an opportunity to use coordinated forest resource planning to involve the people concerned and obtain their commitment to planning and management of State, Federal, and private lands.
- b. There is a potential to develop sheep-grazing opportunities on westside Forests, including use of additional forage available through intensive timber management.

Fish and Wildlife

Description

National Forest System. Regional habitat management efforts consider all vertebrate and a number of economically or socially important invertebrate species. Special emphasis is given to maintaining and enhancing habitat for sensitive, endangered, and threatened species and maintaining or increasing productivity of economically important and game species (e.g., anadromous fish, deer, elk), for both consumptive and nonconsumptive uses.

Management responsibilities for the Region's fish and wildlife resources are shared between Federal and State Fish and Wildlife agencies. The Forest Service fulfills its management responsibilities primarily through habitat management.

Coordination of habitat management activities with State Fish and Wildlife agencies is provided by Public Law 93-452 (Sikes Act), which requires current statewide comprehensive fish and wildlife plans.

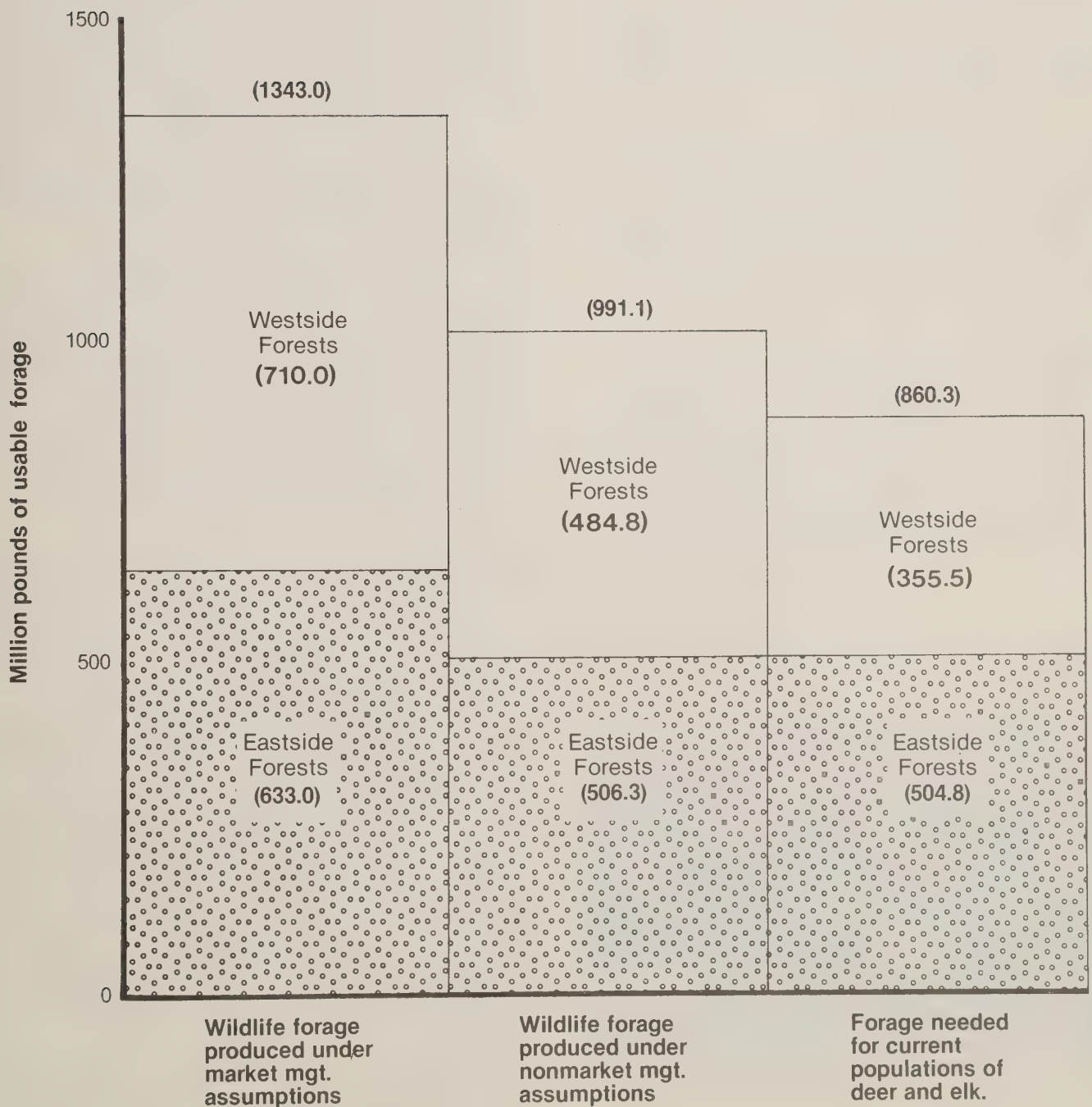
Wildlife. There are 748 vertebrate species known to occur on Pacific Northwest Region National Forests. This total includes resident species and migrant birds and can be subdivided into 179 freshwater and estuarine fish species, 174 species of mammals, 335 bird species, and 60 species of reptiles and amphibians. Little basic inventory information is available for most of these species.

Several groups of species have specific management needs or emphasis. These groups include species dependent on specific habitat conditions, such as riparian areas; cavity-nesters; species requiring early, mature, or old-growth forest conditions for optimum habitat; and popular game species. Snag management is aimed at providing habitat for 31 species of animals.

Game species in the Region include deer, elk, bear, bighorn sheep, cougar, pronghorn, mountain goat, caribou, moose, grouse, rabbit and hare, quail, dove, squirrel, pigeon, turkey, chukar, and a variety of waterfowl. Economically important furbearers include beaver, raccoon, bobcat and coyote. Harvest of 168 species on Pacific Northwest Region Forests is regulated by the States.

A comparison of annual wildlife forage production and estimated forage needs of deer and elk on National Forests is shown in Figure 7. These data show that deer and elk numbers and forage production are in reasonable balance when considering the Region as a whole. There are, however, recognized imbalances on some east side Forests.

Figure 7 A Comparison of Annual Wildlife Forage Production and Estimated Needs of Deer and Elk on National Forests



Four wildlife species registered on the Federal endangered list occur on Pacific Northwest Region National Forests. They are the Columbian white-tailed deer, the California brown pelican, the Aleutian Canada goose, and the peregrine falcon. Of these species, only the Columbian white-tailed deer is known to reproduce on National Forests. The McFarlane's four o'clock is the only Pacific Northwest Region plant officially listed as endangered by the U.S. Fish and Wildlife Service at present. As many as 225 plant species may be reviewed for formal classification by the U.S. Fish and Wildlife Service during fiscal years 1980-81.

The grizzly bear, the bald eagle and the Oregon silverspot butterfly have been Federally designated as threatened within the Region.

The State of Oregon has classified the sea otter, wolverine, kit fox, western spotted frog, northern spotted owl, and the western snowy plover as threatened. All but the kit fox and the sea otter occur on National Forests. The Region has also identified a number of plants and animals that are sensitive to habitat changes.

Fisheries. The Pacific Northwest Region includes approximately 15,000 miles of streams that support both resident and anadromous fish. The Region has over 150,000 acres of lake habitat and 65,000 acres of reservoir habitat that can support both warm-water and cold-water fish. These aquatic habitats range from those of estuaries on the Siuslaw National Forest to alpine lakes along the Cascade Crest. Important resident game fish include rainbow, eastern brook,

brown, Dolly Varden, and cutthroat trout, Kokanee and mountain white fish. They all have high recreational fishery values. Anadromous fish are found on 15 of the 19 Forests in the Region. Anadromous fish have both sport and commercial value. Virtually all watersheds in the western part of the Region support one or more species of anadromous fish.

National Forest lands provide more than 50 percent of freshwater anadromous spawning and rearing habitat in the Region; however, the majority of harvest occurs downstream from National Forests, or in the ocean. Access for migrating adults and smolts, quality of spawning habitat, adequate rearing habitat, and high quality water are critical and primary management concerns on National Forest lands.

Other Ownerships. In the Region, private industrial Forest lands are managed principally for timber production rather than wildlife, while private, nonindustrial lands are likely to have diverse objectives. Nevertheless, privately owned forest and rangelands play a major role in providing key wildlife habitats. From 60 to 80 percent of small game hunting and 20 to 35 percent of big game hunting occurs on private land. Lands managed by other Federal agencies (principally the Bureau of Land Management, Department of Interior) along with State managed lands, contribute about 20 percent of small game hunting and 20-30 percent of big game hunting.²

Threats and Hazards

Although floods and unplanned fires can be disastrous to fish and some wildlife, neither of these is expected to limit wildlife management options. The objectives of fish and wildlife management conflict with other resource management activities when those activities limit food, water, or cover to unacceptable levels. Poorly managed livestock grazing can result in damage to riparian habitats, or livestock may compete with elk for the most desirable forage. Timber management and road construction activities may also degrade riparian habitats. Intensive land use activities affect anadromous fish when they degrade the stream habitat by changing adversely the physical channel conditions and/or the quality of the water flowing in the channels. Land clearing resulting from fire, logging, and grazing can expose large sections of streams, which increases the water temperature, and causes a breakdown of the streambanks.



The Pacific Northwest Region provides habitat for many species of game fish.

²Draft RPA Assessment, Tables 4.13 and 4.15, pages 182 and 186.

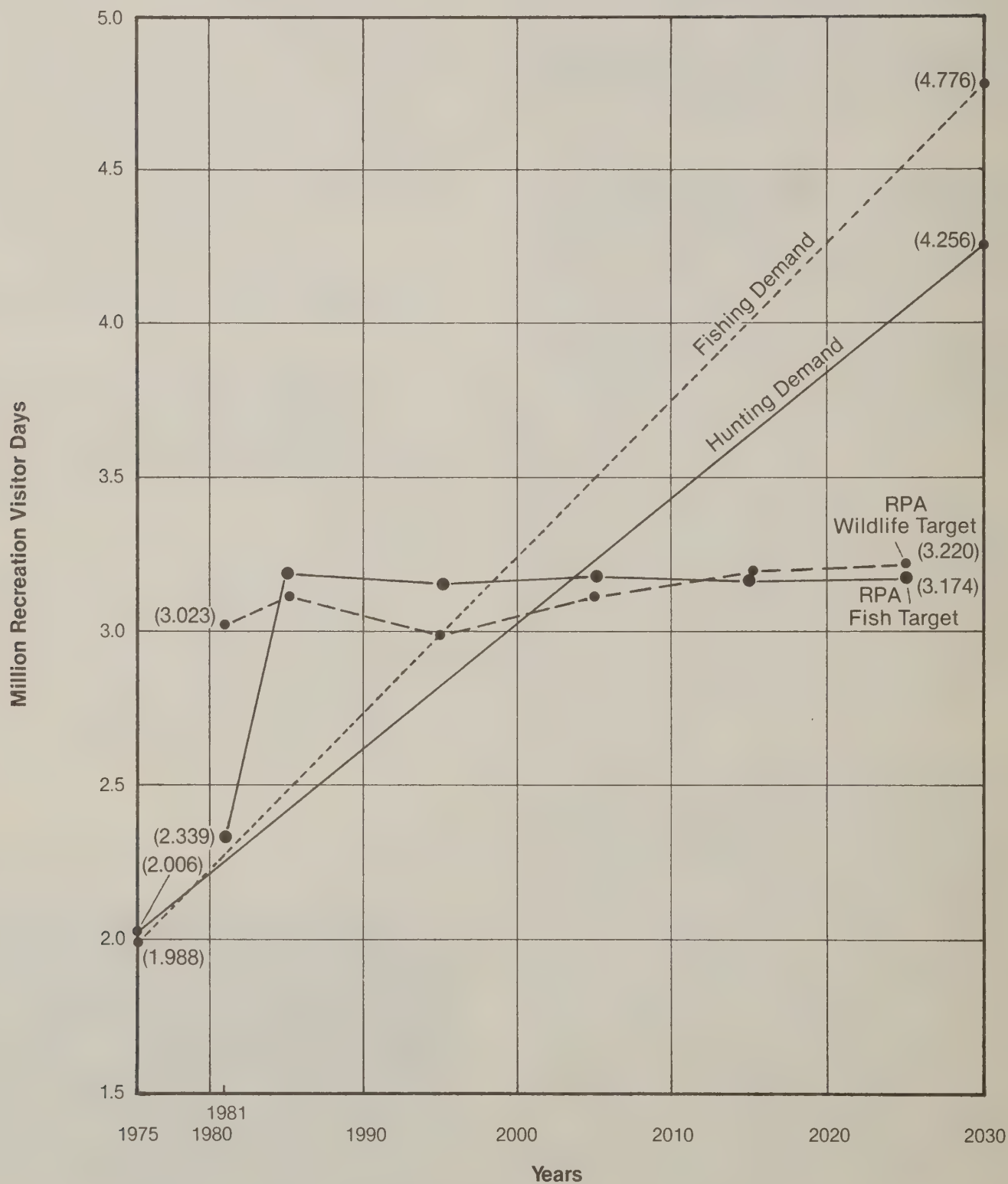
Outputs, Demands and Capability

A long-term high demand for salmon products has existed, with prices rising steadily, and at times dramatically, resulting in an almost fourfold increase between 1967 and 1976. Strong pressures to maintain or expand stocks of salmon made available to the commercial fisherman can be expected.

Increased demands for hunting and sport fishing are also projected based primarily on license sales and participation rates. Demand for all hunting and sport fishing (both resident and anadromous) is expected to increase by about one third between 1980 and 2000 in the Pacific Northwest.

Figure 8 shows RPA targets and projected demand for hunting and fishing on the National Forests. These data reflect a need to place stronger emphasis on both fisheries and wildlife habitat to meet the demand beyond 2000.

Figure 8 RPA Output Targets and Projected Demand for Hunting and Fishing on National Forests in The Pacific Northwest Region



Source: Annual Wildlife Report, U.S.D.A. Forest Service, 1980; RPA Targets, Round 14; Columbia-North Pacific Region Comprehensive Framework Study, November 1971.

Photography, bird watching and other non-consumptive uses of fish and wildlife are also increasing in demand.

Relevant Issues

National Forest Old-Growth Timber. "Old-growth" timber stands contain high volumes of timber. These stands are being harvested and replaced with more thrifty timber. Some species of wildlife prefer, and perhaps require, mature and over-mature stands as habitat.

The northern spotted owl is an example of a species that prefers or requires older age stands. Guidelines for survival of these species must be considered in the land management planning process. Another aspect of the old-growth issue is the public perception and desires for maintaining various amounts and distribution of old-growth stands.

Diversity. The National Forest Management Act of 1976 requires that all management practices will provide for and maintain plant and animal diversity in the land management planning process. There is considerable public and management concerns relating to the concept of diversity. These concerns range from individual species and community diversity to the need for operational definitions and measurement methods.

Of particular concern to wildlife management related to diversity is the application to riparian areas, old-growth timber, and standing and down dead trees.

Riparian Areas. Riparian areas contribute more to the production of wildlife and fish than any other single type of terrestrial habitat. They are also highly important to other competing uses such as timber production, recreation activities and livestock grazing.

Snag Management. Many wildlife species require standing or down dead trees for feeding or nesting. The economic value of dead trees is increasing as the demand for wood chips and home heating fuel expands. Timber management practices are directed to more removal of the dead material to meet these demands and provide better tree planting conditions. Future use of this material for fuel to generate electrical energy may prove to be a major factor influencing the management of snags.

Standing snags in some locations are considered potential hazards in control of wildfire and a danger to forest workers.

Considerable information on wildlife requirements for dead standing or down trees is available. A Regional policy specifies that dead trees, both standing and down, will be provided in sufficient numbers to maintain primary cavity excavators in excess of 40 percent of their potential population capacity on commercial forest lands. Most Forest Supervisors have issued snag management policies more specific to local Forest conditions.

The management concern for wildlife is whether the recognized habitat for cavity-dependent species as prescribed in Regional policies can be supplied on each Forest, while, at the same time, resolving other resource conflicts.

Anadromous Fish. During the past 50 years anadromous fish habitat has been seriously depleted in the process of developing other natural resources in Washington and Oregon. More recently, anadromous fish population decline has been so great that a major regional issue has developed. Commercial, recreational, and Indian fishery interests are all deeply involved in the issue.

National Forest lands encompass a large part (over 50 percent) of the available habitat in the Pacific Northwest. Consequently, the Forest Service will play an important role in protecting good habitat and improving habitat in unsatisfactory condition.

Threatened and Endangered Species. In protecting threatened and endangered plants and animals within the National Forests, the Forest Service needs to avoid or reduce conflicts with other National Forest use and development.

Limiting Factors

- Funds and expertise are not sufficient to redeem both wildlife and fish management objectives, and to coordinate with impacting activities.
- There is difficulty in controlling elk and deer distribution (location and time).
- There is a lack of fish and wildlife habitat inventory information including nongame and threatened and endangered species.
- Snag management has a high cost because of timber left, protection from fire, and safety.
- There is a lack of quantifiable fish and wildlife management objectives.

Opportunities

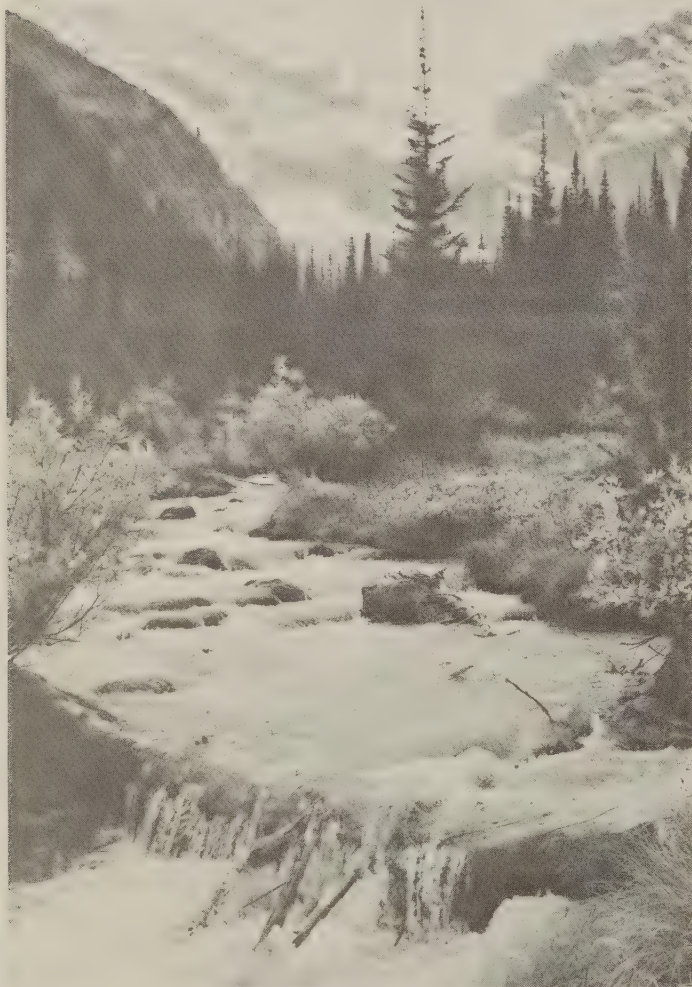
The following opportunities are identified:

- a. To define more clearly the resource trade-offs necessary to bring about improved riparian habitat conditions (improved grazing systems, timber harvest reduction, fencing, etc.);
- b. To maintain a habitat inventory and a fish and wildlife habitat relationship data base; and
- c. To research new techniques of improving habitat and preventing habitat deterioration.

Watershed

Description

National Forest System. Although the National Forests of the Pacific Northwest Region comprise only 23 percent of the land area, 44 percent of the Region's water originates on National Forests.



Forty-four percent of the Region's water originates on National Forest land.

Much of the water derives from snow and glaciers via surface and ground water systems. Consequently, National Forests play an important role in supplying water later in the year when consumptive demands such as irrigation are highest.

In contrast to conditions in many parts of the Nation, the Region's surface and ground water quality is generally very good on the National Forests. Consequently, there is much emphasis to maintain the water in that condition.

There are 18 municipal supply watersheds on National Forests in Oregon and Washington that have been formally recognized through signed agreements with the Secretary of Agriculture or Forest Service, through Congressional legislation, or by Executive Order. There are also numerous watersheds supplying water for domestic uses for which no formal agreement exists. In total, there are about 3.7 million acres of National Forest Land that are the direct source of domestic water.

The Pacific Northwest Region contains numerous riparian ecosystems separated into two geographic areas. West of the Cascade crest, the riparian ecosystems are characterized by being narrower, more precipitous, and supporting vegetative communities that often lack definition when compared to vegetative communities on adjacent uplands. The riparian ecosystems east of the crest, are generally wider, less precipitous, and have vegetative communities that are distinctly different from vegetation on adjacent uplands.

Other Ownerships. On State and private lands, the Forest Service provides technical assistance through a variety of USDA programs to improve watershed management. These include various river basin programs, emergency flood prevention, watershed protection and resource conservation and development. The focus of Forest Service participation is land and resource management rather than facility construction. USDA river basin studies are used as a vehicle to collect and assemble planning information at the watershed, State, or Regional level for incorporation into Regional Forest Service land and resource management plans.

The Forest Service has participated with other State and Federal agencies in preparation of a framework Columbia River Basin Plan. From this, plans for the Willamette, Puget Sound, Okanogan-Methow, and Yakima River basins were developed. These Water Resource Council plans are the basis for measuring the

consistency of other resource planning, including Forest Service plans. In addition, the Forest Service has worked with other USDA agencies to develop the Palouse, Entiat and Yakima sedimentation studies and is currently involved in southeast Washington and north central Oregon.

A principal responsibility is to provide for implementation of these plans and up-to-date soil, water, and planning technology through State and private user groups. This includes application of best forest management practices to alleviate serious problems such as mass soil and debris movements in stream channels, soil compaction, surface erosion, and flood damage resulting from accelerated runoff.

Threats and Hazards

Vegetative communities in many eastside riparian areas do not resemble natural conditions. Most riparian areas east of the Cascades have been heavily used by domestic livestock for the last 70 to 100 years, as well as for other activities such as timber harvest, recreation, road construction, and mining. In some areas, these activities, either singly or combined, have significantly altered riparian areas. As a result of these activities, some riparian areas are not currently providing for maximum multiple resource uses, such as fish and wildlife, timber, recreation, watershed management, and livestock grazing.

Sediment is the primary pollutant from forest land, but forest lands account for a very small percent of all the man-caused sediment in the Region's water supply. The Water Resource Council and USDA River Basin Studies show sedimentation from agricultural lands to be significantly higher. This is partially due to the annual cropping and resultant soil disturbance. State and Federal remedial programs have, therefore, focused on agricultural lands rather than forest lands.

Outputs, Demands and Capability

Currently, total withdrawals of surface water within Oregon and Washington average 53 million acre-feet annually. Withdrawals are projected to reach 201 million acre-feet by the year 2020. About 90 percent of the use is for irrigation.

Approximately 75 million acre-feet of water originates on the Region's National Forest lands.

Relevant Issues

Some municipalities have pressed for restrictions on all activities, including recreation and timber management, in municipal watersheds to achieve water quality that will not require filtration or further treatment. Allocation of additional National Forest lands to provide

municipal water supplies may lead to strong pressures to limit or eliminate other uses. In addition, much of the public concern relating to water quality is based on a desire for pure water which people associate with pristine watersheds. The above concerns identify a major regional issue: "How much, if any, of the National Forests should be set aside exclusively for municipal water supply?"

Other water quality issues include:

- a. Timber management activities such as road construction and logging may result in mass wasting, siltation, and/or destruction of riparian habitat; and
- b. Concentration of livestock in riparian areas may cause degradation of water quality, influence flow characteristics, and reduce productivity of fish and wildlife habitats.

Limiting Factors

- a. Nonindustrial private landowners have different ownership objectives, which may not emphasize watershed management.
- b. There is considerable economic data on commodity resources such as timber, but little on intangible resources such as water quality.
- c. There is a lack of incentives or knowledge to nonindustrial private landowners for improved management.
- d. Knowledge of bacteriological relationships to the forest environment is limited.

Opportunities

The following opportunities are identified:

- a. To develop strong public support for Forest Service's efforts to manage for high water quality;
- b. To work with local governments and other agencies to provide coordinated forest resource planning; and
- c. To monitor, evaluate, and correct effects of most land management practices through modification of practices without major financial adjustments.

Recreation

Description

National Forest System. The recreation resource on National Forest System lands in the Pacific Northwest provides widely diverse recreational opportunities, largely because of the mix of climates, landforms, and accessibility found in Washington and Oregon. Nearly any type of recreational experience, from resort living to rugged backcountry treks, is available. Three National Forests — the Olympic, Siuslaw, and Siskiyou — are on or near saltwater. Other National Forests

encompass the grandeur of the Cascades and the beauty of desert panoramas.



The Pacific Northwest Region provides diverse recreational opportunities.

Because of their unique qualities, two areas within National Forests of the Pacific Northwest Region have been congressionally designated as National Recreation Areas — the Oregon Dunes on the Pacific Coast and Hells Canyon on the Snake River. These two areas total about 700,000 acres. Congress has also designated Scenic-Research Areas, The Pacific Crest National Scenic Trail, and three National Wild and Scenic Rivers with a combined total of 10,000 acres.

Not all recreation activities take place within these specially designated areas. Almost all National Forest Lands contribute to a variety of recreation use patterns and/or developments.

Recreation use presently includes camping, hotels, lodges, resorts, motoring, hiking, hunting, fishing, and skiing. The capacity of all recreation sites developed to enhance various activities is 159,000 people at one time —exclusive of those established for downhill skiing.

The Region presently maintains 1,009 campgrounds with a capacity to accommodate 83,500 people at one time. These campgrounds are distributed throughout the entire Region with the majority located on those

Forests close to population centers. Many of these sites are quite old, and need major reconstruction to meet today's standards.

There are 49 winter sports sites, 25 of which include alpine skiing located on National Forest lands throughout the Pacific Northwest with a capacity of 94,800 people at one time. Any major expansion of downhill skiing facilities will probably be on National Forest land.

Closely related with the recreation resource are wilderness and the visual resource. These are briefly described in the following sections.

Wilderness. The basic mission is to secure for the Nation the benefits of an enduring wilderness resource by administering and protecting designated wilderness on the National Forest System. This is done by leaving wildernesses unimpaired for future use and enjoyment; preserving their wilderness character; and providing information on their use and enjoyment.

The Pacific Northwest Region presently administers 2,842,071³ acres of designated wilderness. The rate of use differs widely between individual wilderness areas throughout the Region. Some areas receive little use while some of the more popular wilderness areas near population centers are beginning to exhibit signs of resource degradation.

The Roadless Area Review and Evaluation (RARE II) process has recommended the addition of 802,502 acres to the wilderness system within the Region. This recommended addition would not only include ecosystems which are not presently represented, but would increase the opportunity for wilderness experience in those areas closer to major metropolitan areas.

The Rare II process has also designated 627,000⁴ acres for further planning. These areas will be analyzed in Forest Plans using the decision criteria developed in the RARE II Final Environmental Statement dated January 1979.

Visual Resource. The Pacific Northwest Region has a national and international reputation for its outstanding mountain, valley and coastline scenery. The most valuable scenery in the northwest is on those lands that are not only distinctive in character, but highly visible from scenic travelways and resort and recreation areas.

³ Includes area within the Hells Canyon National Recreation Area in Idaho.
⁴ Ibid.

Visual quality is classified into categories relating to scenic variety and how often it is seen by the viewing public. The "most valuable scenery" category is described by two standards called retention and partial retention (see Glossary for definitions).

Although the majority of the most valuable coastal and valley scenery is under State or private control, much of the most valuable mountain scenery is located with the 24 million acres of National Forest lands. In these lands about 16.5 million acres are classified as commercial forest lands. Approximately 60 percent (9.5 million acres) of the commercial forest land are inventoried in retention or partial retention standards and have the potential to have severe conflicts between visual management of the scenery and timber management of the commercial forests.

The demand for scenic quality and the concerns for degradation of scenic quality potential are increasing and are expected to continue to increase during the planning period. Recreation use in the Region exceeds that in all but one other Region and the concern level of northwesterners and visitors is high and increasing yearly.

It is the policy of the U.S. Department of Agriculture to advocate the conservation of natural and man-made scenic resources, improve the technical ability of agencies to identify and evaluate scenic resources, and assure that its agencies protect and enhance the visual quality of the landscape. The Forest Service, in turn, has a policy to protect and improve the quality of natural beauty. The Pacific Northwest Region's mission includes applying these policies, along with other policies, goals, targets, and objectives, to all activities that result in visual alteration of the National Forest landscapes.

It is estimated that timber harvest has occurred on about 25-30 percent of the westside National Forest lands. Because most of this is clearcutting, the visual affect of this management (and other management activities such as roads and utility lines) has altered about 70-80 percent of the overall westside visual quality. On the eastside forests it is estimated that timber harvest has occurred on about 70-80 percent of the lands or altered by other management activities. Eastside timber management is much less noticeable because of its selective nature and the higher ability of the landscape to absorb visual alterations. Therefore, the net effect on the eastside has altered about 20-25 percent of the overall visual quality.

Combining the westside and eastside it is estimated that 50 percent of the region has been noticeably altered. These alterations vary from slight to heavy visual impacts. Most of these alterations have occurred in commercial forest lands classified in a less valuable scenery category. However, the present trend is toward increased cutting in the most valuable scenery areas that have been bypassed before now. These are areas that are distinctive in character and visible from scenic travelways and recreation areas. To some extent, the northwest tourist industry depends on the scenic image people hold for the forested landscape in which these increased activities will be taking place.

Existing management direction is expected to continue the historical trend of altering the overall visual condition during the next 20 years.

Other Ownerships. The Pacific Northwest Region also includes four National Parks, which contain 1,755,000 acres and three National Recreation Areas administered by the Park Service which contain 280,000 acres. These areas hosted 6.2 million visits in 1979.

The Bureau of Land Management hosted 4.3 million visitor days⁵ in 1979.

Both Oregon and Washington have well-developed State park systems. In 1975, people participated in 558 million outdoor recreation activity occasions in Washington and Oregon. These occasions ranged from cultural events and golfing to wilderness camping.

The States provide recreation direction through statewide planning. The Statewide Comprehensive Outdoor Recreation Plan (SCORP) is developed to guide all outdoor recreation supplied through various programs.

The Forest service assists in the development of recreational resources through its State and Private Forestry programs. As provided for by the Cooperative Forestry Assistance Act of 1978, the Forest Service supports technical assistance to private landowners and encourages management of forest lands for multiple use. The vehicle for such technical assistance is the forest management plan, developed in conjunction with a State service forester. Individualized management plans may encourage dispersed recreation uses (e.g., hunting) which are compatible with commodity production. Present programs for both States are funded at low levels, but could be expanded.

⁵The various agencies use different measures of recreation use that are not directly comparable to each other.

Threats and Hazards

Tree diseases and insects are potential threats to the existing recreation resource. Trees with rot-weakened root systems are more susceptible to blow down, creating a potential hazard in campgrounds and other areas of high visitor concentration. Insects may also kill trees that have been weakened by abuse or trampling in campgrounds or other areas of high public concentration. Insect epidemics may cause widespread tree defoliation or mortality, which destroys the natural attraction of forested areas, thus changing the visual character of the landscape.

Fire represents some hazard to the recreation resource. Periodic flooding can have an adverse effect on river and stream oriented recreation including existing campgrounds located within flood plains.

Outputs, Demands and Capability

During 1979, the National Forest System of the Region hosted 31.6 million visitor days, including 1.0 million visitor days to Wilderness, 11.2 million-visitor day use of developed sites, 2.0 million-visitor day use of ski areas, and 17.4 million-visitor day use of dispersed recreation. A significant portion of the dispersed recreation use occurred in existing undeveloped areas. During 1979, the total Regional expenditure for Forest Service recreation management was \$16.9 million.

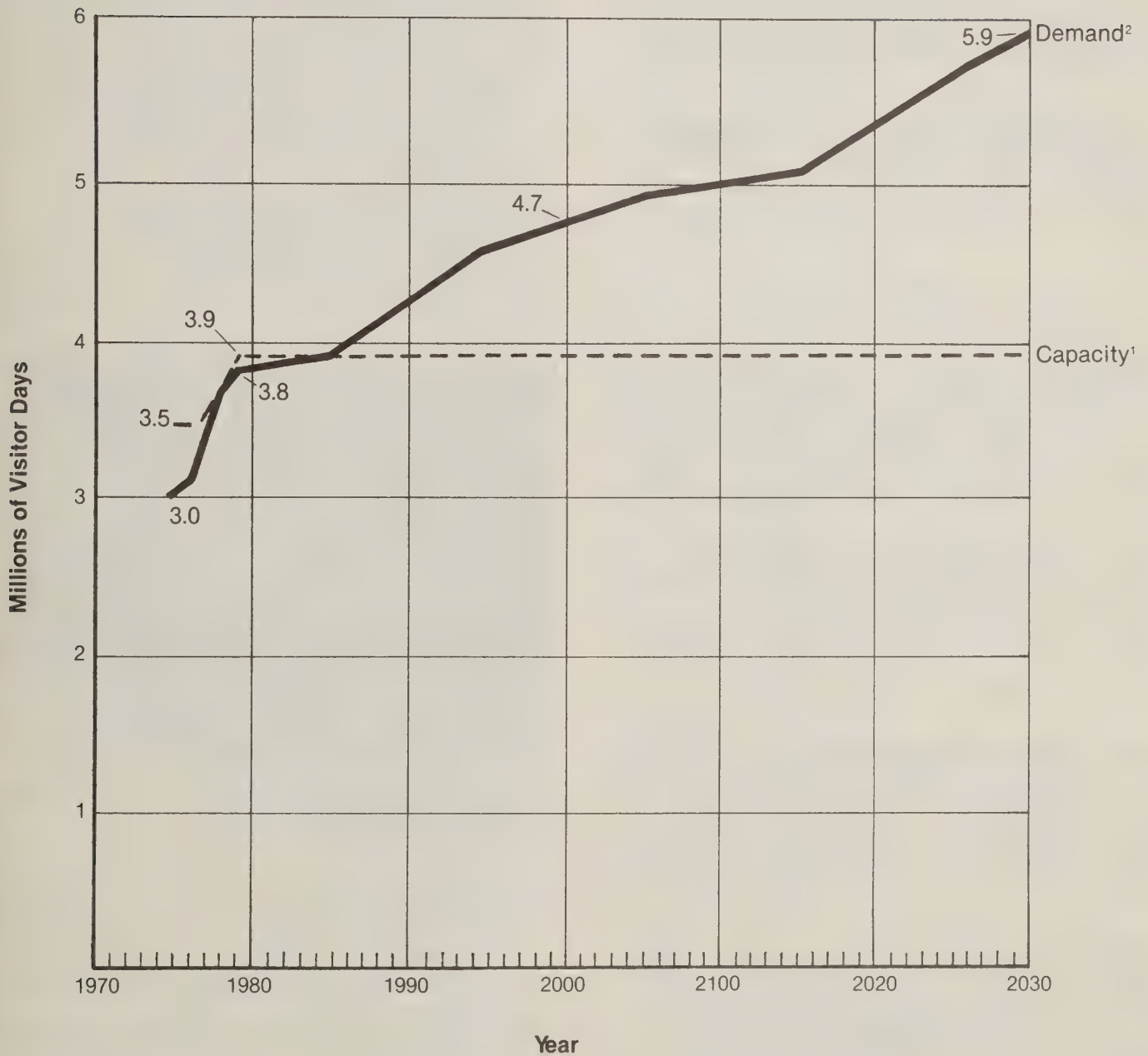
"Demand" in outdoor recreation primarily reflects changes in population levels, population characteristics, and per capita participation rates. Projections of land-based recreation for the Nation range from 10 percent to 44 percent increase above 1980 by the year 2000. Regional projections indicate about 32 percent increase above 1980 by the year 2000. Individual forest projections range from 24 percent to 65 percent increase during the same time period. Individual land based activities that are projected to undergo the most rapid relative growth between now and 2000 are developed site camping and dispersed camping. Recreation use on National Forest land is expected to exceed 55 million visitor days by 2030.

Wilderness demand and capability analysis are shown in Figure 9. Assumptions used in these projections include:

- A carrying capacity was developed for the wilderness areas within each National Forest. The objective was to estimate the number of people that could visit the areas and still maintain the wilderness resource and experience. Factors considered were vegetative types, topography, length of season and dispersal opportunities.
- Capacity from 1975 to 1979 includes existing Wilderness plus Wilderness Study from RARE I.

- Capacity from 1979 to 2030 includes existing Wilderness and areas recommended for Wilderness, and those designated for further planning by the RARE II process.
- Demand is projected at 11 percent of the total recreation demand for National Forest lands. This approximates the percentage of total recreation use that is now occurring in designated wilderness and present undeveloped areas.
- A portion of that demand is being met by use of presently undeveloped areas allocated to nonwilderness and designated for further planning (2.6 million visitor days in 1977).

Figure 9 Wilderness Capacity and Estimated Demand for Wilderness and/or Primitive Type Recreation Use



¹Capacity includes existing wilderness, recommended areas and further planning areas X estimated carrying capacity.

²1974-79 demand includes wilderness use plus estimated use in undeveloped areas.
1980-2030 demand equals 11% of total projected outdoor recreation use.

The Region does not have the capability to meet projected demand for wilderness-type use within the wilderness system. Wilderness use will increase not only as a function of population but also as use in presently undeveloped areas is displaced by other resource activities. By approximately the year 1985, the Region will not have the capability to meet the demand for this type of recreation within the wilderness system. The continued existence of undeveloped areas will accommodate the increased demand for some time beyond 1985.

The Region has the capability to meet RPA targets for both developed and wilderness/dispersed recreation when the latter two are combined. The Region has the capability to meet 2030 RPA targets for wilderness acreage.

Relevant Issues

Outdoor Recreation (Conflicts Between Users). The Pacific Northwest Region can provide a wide variety of high quality recreation activities. This variety of uses, however, can result in conflicts between users. For example, swimmers, boaters, fishermen, and campers may want to use the same lake; or backpackers and off road vehicle users may want to use the same acres for respectively unroaded or roaded recreation. The transportation system (including trails) is also subject to conflicting recreation demands. Foot, horse, and motorized travel may not be compatible on the same trail and thus may require the construction of the same type of road or trail.

Conflicts Between Resource Uses. The use of the National Forests for commodity type outputs, particularly timber harvest, often conflicts with the objective of recreation users. The amount and location of areas available for unroaded or wilderness recreation is of particular importance to many recreationists.

Timber Supply from National Forests. As previously discussed, the allocation of Forest lands for a variety of recreational uses, including Wilderness, effectively reduces the acreage available for supplying timber. Meeting visual quality objectives reduces timber outputs.

Wilderness. Because of the increasing demand for wilderness, there is a need to provide for various wilderness management options.

Limiting Factors

Factors that limit recreation resource management are:

- a. Ineffectiveness in reaching users and providing them with appropriate information about management or regulations pertinent to the use of a particular National Forest area;
- b. Lack of public knowledge of where to go and what to do. Lack of public knowledge on proper behavior in an outdoor setting;
- c. Impact of liability laws, reduced public access, and changing values on potential private recreation resource availability and development;
- d. Lack of market analyses for recreation resources for private lands;
- e. Cost of regulation and enforcement;
- f. Disincentives to private forest landowners for increased recreation development;
- g. Insufficient data on private forest land supply and use levels;
- h. Effect of energy cost on distribution of recreation activities;
- i. Cost of potable water and sanitation requirements on development of private resources; and
- j. Need to rehabilitate or relocate existing campgrounds to meet existing demand.

Opportunities

The following opportunities are identified:

- a. Increase user education on appropriate behavior concerning the use of recreation resources;
- b. Increase cooperation and joint effort with other public agencies engaged in managing outdoor recreation and people programs;
- c. Where possible, to physically separate conflicting recreation activities;
- d. Provide for more close-in recreation to urban populations;
- e. Provide opportunities for primitive type recreation use in unroaded areas to offset a projected shortfall in satisfying recreation demand in Wilderness;
- f. Promote and better organize the use of volunteers in recreation management;
- g. Promote use of public transportation to and from recreation complexes;
- h. Encourage private investment in providing recreation facilities on National Forests; and
- i. Encourage States' participation in coordinated forest resource planning, including considerations of a recreation role for nonindustrial private landowners.

Cultural Resource

Description

National Forest System. Present knowledge of the extent of the regional cultural resource base, including areas of cultural and/or religious significance to American Indians, is limited. However, it is known that the National Forest System contains a great number of sites which can lead to a better understanding of the heritage of the Pacific Northwest. The exact nature and distribution of these resources is not yet determined. Three million acres or about 12 percent of the total National Forest System lands have been inventoried. Site evaluation and enhancement lag behind the inventory program. To date, 12 heritage properties are included on the National Register of Historic Places, and 7 additional nominations are pending. A total of 826 cultural sites are afforded protection. Presently 190 cultural properties are interpreted or otherwise enhanced for public knowledge and enjoyment.



The current cultural resource program direction places primary emphasis on inventory and documentation of compliance with laws and regulations. Secondary emphasis is placed on protection, enhancement and other affirmative cultural resource management activities. To meet all mandated cultural resource responsibilities, investment levels would have to increase 150-200 percent.

Other Ownerships. The identification and inventory of cultural resources on other Federal lands is also somewhat limited because of past funding constraints. Privately owned cultural resources include both historic (houses, commercial structures), and prehistoric sites. Some historic resources are open to the public; very few prehistoric resources are available either for scholarly study or public enjoyment.

Threats and Hazards

Fires, insects, diseases, landslides, or floods are not expected to threaten or destroy cultural resources on a Regionwide basis, although localized damage will occur. Vandalism will continue to be a constant threat.

At this time, unevaluated cultural resources are protected from direct project impacts through physical avoidance. The actual acreages involved are relatively small (less than 1 percent of total), and there is little impact on the output of other goods and services. The potential for resource conflict increases as the acreages allocated to other resource management activities increase. The impacts to some cultural resources may be unavoidable as need to provide other outputs increases.

Outputs, Demands and Capability

Data are not available for calculating "cultural resource visitor days;" but given the 31.6 million total visitor days in the Pacific Northwest Region (1979), it is clear that cultural resource activities can be increased substantially to add to the total recreation experience of the Forest visitor. Management expenditures, including those for evaluation and enhancement, will need to increase to produce these outputs.

The current annual workload may be measured in assigned output targets as follows: inventory of 250,000 acres per year; evaluation of 500 cultural/historical sites per year; protection of 500 cultural/historical sites per year; and enhancement of 19 properties per year.

The rate of identification and management of significant cultural resources has increased on both National Forest and private lands since 1974. Private efforts, however, have focused primarily on historic structures. Private investment in rehabilitation and restoration of these structures has increased dramatically since 1976, when tax incentives, grants-in-aid, and improved communication about the advantages of historic preservation stimulated private sector investment. The type and rate of resource conflicts have remained fairly steady on National Forest System land since 1974. The apparent increases in conflicts are due to improved early identification of potential conflicts. Both costs and outputs have increased steadily. Supply of cultural resources is finite and nonaugmentable. Demand for public and scholarly use is expected to increase as the resource base diminishes through use, management decisions, or vandalism and as research techniques, research questions, and adaptive or continued use priorities change.

Relevant Issues

There is a need to discover, manage, protect and interpret cultural resource values which are qualified and may qualify for inclusion in the National Register.

Limiting Factors

Cultural resource management is labor-intensive and the required evaluation, protection, maintenance, rehabilitation, and interpretation can be costly. Funds for cultural resource management must compete with other resource management activities. Emphasis on high commodity resources may restrict options for management of identified cultural resources. Private holdings have focused on protecting and developing income-producing activities and sites.

Some people regard cultural resources as "frills." Public attitude often encourages individual collecting, which the government considers vandalism. As the resource base is diminished, the public may demand that efforts be increased to conserve remaining cultural resources. Without a solid technical and managerial foundation, decisions may generate unnecessary controversy.

On private lands, landowners often have objectives which are in conflict with the preservation of cultural resources. Thus, public concern for cultural resources is focused on public lands, and the responsibility of private landowners is either unrecognized or ambiguous. On State and private lands, on-going activities may obliterate sites.

Opportunities

Given current knowledge of the cultural resource base in the Pacific Northwest Region, programs can be designed to provide:

- a. Allocation of archaeological and historical resources to appropriate scholarly use;
- b. Interpretive programs for public enjoyment;
- c. Encouragement of multiple use management, including Cultural Resource Management activities, through technical assistance to State Foresters and coordination with State Agencies; and
- d. Identify types of sites on National Forests having income potential.

Minerals and Rock Resources

Description

Approximately 20,000 mining claims have been located on National Forest lands of the Pacific Northwest Region. However, there is a low level of mining activity in relation to the number of claims. The majority of mining claims do not represent mineral occurrences

which justify exploration or investment. Large numbers of claims in certain areas are located for purposes other than mining such as recreational activities. In recent years, large energy and mineral resource companies are expending effort and monies in mineral searches in the region. Successes are in finds of economic copper and gold deposits and good prospects for uranium, molybdenum, mercury, and geothermal resources. Two critically short metals, chromium and nickel, occur in the region in presently uneconomic deposits. The U.S. Bureau of Mines is evaluating these deposits for use in case of a national emergency. (See Energy for discussion of fossil and geothermal resources).



Rock material resource includes rock, gravel, sand, and soil materials that are of sufficient quality to be utilized as construction materials. They provide the primary material for construction and maintenance of the Forest roads and trails. National Forest utilization within the Pacific Northwest Region is expected to continue at or near current levels (10.3 million tons per year). In addition, increased resource pressure is expected from other public and private users as off-Forest rock sources are depleted.

Relevant Issues

Two principal management concerns have been identified. The first relates to the uneven distribution of suitable rock materials throughout the Region. The second is past inefficient utilization of rock resource.

The effects of these problems are: increased transportation system construction and operating expenses; timber sale administration delays and cancellations; and adverse impacts upon Forest visual resources and air and water quality standards.

Opportunities

There is an opportunity to develop a Regional Policy that will provide an administrative framework for:

- a. Assessment of resource reserves;
- b. Response to future needs of Forest Service, public, and private use; and
- c. Establishment of practices that will insure conservation of the nonrenewable resource.

The Regional Policy should address the following:

- a. Inventory assessment, reporting and control;
- b. Regional format for Forest resource management plans;
- c. Site investigation and development documentation standards;
- d. Establish test and evaluation criteria for poorer quality material to conserve the resource and reduce energy requirements;
- e. Effect in-service and interagency coordination for efficient overall resource use;
- f. Establish and monitor resource planning performance time; and
- g. System feedback and modification for improvement.

Transportation

Description

The National Forest transportation system in the Region includes 85,000 miles of road and 14,000 miles of trail, making the Forest Service one of the largest road system managers in the Pacific Northwest. During the past 5 years, the response to resource targets has required the construction of an average of 1,000 miles per year of new roads and 2,000 miles of reconstruction. This program encompasses all types of roads in all types of terrain. Annually, an average of 135 miles of trails are constructed or reconstructed.

The Region's fiscal year 1980 roads and trails budget contained \$25 million for maintenance, \$20 million for construction, \$49 million for engineering services, and \$135 million purchaser credit and opted road funds to sustain the road and trail activity in support of resource programs.

The interconnection between State, county, and Federal roads means that any action on one system may have an effect on others. States and counties are very aware



The National Forests of the Pacific Northwest Region contain 85,000 miles of road.

of these impacts and desire to be a part of National Forest program changes.

Trends

The primary need to construct or reconstruct roads today is to provide access to timber harvest areas and to provide the facilities necessary to match the logging system to be used. As harvest schedules have progressed, more and more difficult terrain is being made accessible which has the potential for higher resource impact.

To extend the hauling season in order to move approximately 5 billion board feet of timber annually, many roads are surfaced (gravel or pavement) to avoid excessive road damage during wet weather, soil disturbance, siltation, dusting from road surfaces, and excessive maintenance cost.

Some roads are wider than several years ago to accommodate the yarding equipment required by cable yarding systems. Typical yarders weigh 95 tons and

require 12-14 foot road width. These yarders make it possible to have fewer roads; but the roads must have better foundations, surfacing and bridges to support the weight.

The use of more retaining walls, drainage structures, and similar permanent devices may give the appearance of overbuilding, but often makes it possible to stabilize a road that might otherwise have intolerable impact on adjacent resources. Many of today's road features, which appear to some to be "overbuilt," provide access in steeper country and still minimize resource impacts. Improved technology can significantly reduce some impacts of road building.

Relevant Issues

Problems from roads in the National Forest have not changed to a large degree in 15 years. In summary, they include overbuilding, loss of wildlife habitat, degradation of riparian areas and fish habitat, and user conflicts. Soil movement is very critical in steep terrain. Areas once reached only by trail are now accessible to a variety of vehicles. Trails are often discontinued. Road access reaches into some areas used by those who seek unroaded experiences. Wildlife biologists are alarmed at the invasion of previously undisturbed habitat. Fisheries biologists see increased danger of water quality degradation. The recreational motorist does not want to become involved in industrial traffic. The solution for some is to close roads after harvest while others see this as a violation of the right to enter public land for hunting or other activities. The transportation system issue can be summarized as: "How should the various objectives of different interest groups be met by the Forest Service in managing roads and trails in the Region?"

Both the public and management perceive the necessity of defining the intended use of the road and building the most appropriate type of road for that use. The desired objective is to avoid the "overbuilt" road, (i.e., too much resource impact, too many miles of road, more permanent or elaborate than necessary). Additionally, NFMA regulations, Section 8(c) states: "Roads constructed on National Forest System lands shall be designed to standards appropriate for the intended uses considering safety, cost of transportation, and impacts on the land and resources."

Limiting Factors

Limiting factors have been identified as follows:

- a. Conflicts between users of the transportation system are often the result of conflicting desires for land use;
- b. Limited energy supplies, particularly fossil fuels;
- c. Limited capital for investments in transportation systems to serve non-industrial users; and
- d. Low funding level for Forest highways in the Region will curtail land management activities.

Opportunities

The following opportunities for transportation management are identified:

- a. Develop objectives for resources and transportation as integral parts of management prescriptions;
- b. Identify intended uses of resources; establish guidelines and standards for transportation development, operation and maintenance that are appropriate for the intended uses;
- c. Increase public involvement in transportation planning;
- d. Plan for cost share programs to encourage appropriate road systems to serve intermingled State, private, and National Forest lands;
- e. Give technical assistance in proper road location and design on State and private lands;
- f. Coordinate with regulatory agencies to improve assistance to State and private landowners.

Energy

Description

The abundance of large rivers and mountainous topography, coupled with large amounts of public works money, created an almost total hydroelectric base in the Region, since it has no oil resources (at this time) and only limited coal and natural gas. Many of the hydroelectric sites are not fully developed due to the economics of the time. Reevaluation of existing hydroelectric and water storage dams and reservoirs is necessary to determine remaining potential.

The principal sources of energy nationwide are the hydrocarbons — oil, gas, and coal. Although not as significant as elsewhere in the Nation, the Pacific Northwest Region has a potential for producing hydrocarbons, as evidenced by some 900 oil and gas lease applications and 50 leases in effect. Coal is also known to occur within the National Forests.

At the present time, other energy sources such as wind, solar, biomass and geothermal contribute only a small portion of the energy production from the National Forests.

Trends

The potential for geothermal energy in the Pacific Northwest Region has been rated by the U.S. Geological Survey as very high in the Cascades and particularly so in Oregon. The total potential is estimated at some 3.0×10^{16} BTUs or the equivalent of some 1.0×10^{10} megawatts of electrical current. Interest in this resource is shown by some 700 lease applications and 35 issued leases. Solar collector and wind generation site development will probably become of major significance by about 1990.

Approximately 300,000 acres of forest lands within the National Forests in the Region are used for energy and water resources development and transmission. Because of the nature of energy development, particularly hydroelectric, they often occupy the gentler terrain and more productive forest lands. Thus, the trade-offs to forest productivity are greater than the 300,000 acres would indicate. Future energy developments on National Forests could cause changes in forest user activities. The actual mix of developments and their cumulative impact are difficult to quantify. It is estimated that about 1.5 million acres of additional energy development occupancy will occur by 2020.



Approximately 300,000 acres of National Forest lands are used for energy, transmission and related water development.

Relevant Issues

The primary public issue on energy can be stated as: "How can the National Forests be better utilized as major contributors of both renewable and nonrenewable energy resources, such as hydropower, geothermal, wood, wind, solar, coal, oil, gas and uranium?"

Limiting Factors

- Many energy developments have significant environmental and resource productivity impacts.
- There is fragmented agency responsibility for the development for energy sources.
- Role of Forest Service in production of energy is poorly defined.

Opportunities

The following opportunities for energy management are identified:

- More pilot projects are needed to measure economic and environmental effects of alternative energy development;
- To develop more efficient means of providing renewable energy resources to users, such as more efficient transportation of wood fuel for heat energy; and
- Providing access to fuel wood and sites for wind generation and small hydroelectric facilities to rural and small community populations.

Fire Management

Description

Historically, Forest Service fire management policy directed that forest and range fires be attacked with enough forces to gain control as quickly as possible. Each wild fire was suppressed regardless of vegetative type, burning conditions, fuels, or land management objectives.

During the 10 year period, 1970-1979, the Region's National Forests experienced 20,895 fires and 253,216 acres burned. Extremely dry summers, coupled with steep terrain, heavy fuel loading, and limited access, provided the ingredients for large project fire occurrence. Fire prevention and protection has been developed and integrated through cooperative agreements with State and other Federal organizations. Both the Washington Department of Natural Resources and Oregon Department of Forestry have firemanagement organizations that have excellent prevention and suppression capabilities. They have responsibility for protecting many scattered small ownerships as well as some of the major industrial

timber company lands. Individual landowners are taxed to reimburse the States for the protection services.

In many locations, State protected lands lie within or adjacent to National Forests. State agencies have responsibility for suppression action on any fire within their protected areas. Prescribed fire is primarily used to prepare sites for regeneration and to dispose of hazardous fuels.



Dry summers, when coupled with the Pacific Northwest Region's steep terrain and heavy fuel loading, provide the ingredients for large project fire occurrences.

Trends

By the mid-1960's and early 1970's, professional opinion in many fields recognized that both prescribed and wildfire have an important role to play in forest and range ecosystems.

Forest Service policy has also recognized a changing role for fire management. In February 1978, national policy was revised to provide well-planned and executed fire protection and use programs that are cost effective and responsive to land and resource management goals and objectives and supportive of RPA outputs.

Relevant Issues

Fire management was identified as a management concern because current fire management policies are not fully integrated with objectives of other resource

management. The assessment and identified opportunities indicate that the concern can best be handled through functional coordination and does not require a change in management direction.

Limiting Factors

The following limiting factors are identified:

- a. Competition for air space in terms of emissions limitation (See air quality discussion);
- b. Public concern for the appearance of fire blackened areas (from Wilderness as an example);
- c. Inaccessibility and inability to protect municipal watersheds on National Forest lands; and
- d. Differing attitudes between Federal, State and private protection organizations regarding fire as a management tool.

Opportunities

The opportunities to improve fire management are as follows:

- a. To develop Regional policy for flexibility in funding of fire activities, an interdisciplinary approach to fire management, development of appropriate expertise to support the shifts in programs, and involvement of cooperators and publics;
- b. To implement a concerted "Inform and Involve Program" not only with the public and their representatives, but with State and other Federal agencies, the timber industry, and internally within the Forest Service;
- c. To develop more fire cooperatives and to include the involvement of local governments; and
- d. To emphasize the use of prescribed fire as a management tool to improve resource production such as wildlife habitat and grazing potential.

Air Quality

Description

With the growth of the environmental movement and the passage of the Clean Air Act in 1963, slash-fire smoke attracted attention as a major pollutant.

Timber harvest operations create about 12 million tons of debris each year. Of this total, plus the tonnage contributed by the backlog slash treatment program, 5.25 million tons of slash are actually burned or consumed.

Until recently, slash burning was largely carried out during the fall months, when thousands of tons of debris were burned in a 6- to 10-week period. This loading of the atmosphere, coupled with unfavorable atmospheric conditions for dispersion of the smoke, occasionally produced exceptional pollution episodes.

Current smoke management plans are based on: (1) scheduled burning according to weather conditions, and (2) locations of the burn sites relative to smoke sensitive areas. Current smoke management practices cause burning to be done only when atmospheric conditions take the smoke away from populated areas. For most Forests this means that the smoke is carried toward areas, such as wilderness, where only the slightest reduction of air quality is allowed. The Oregon Department of Environmental Quality administers agricultural burning including the grass field burning in the Willamette Valley. From mid-July to mid-September, forestry burning is restricted in favor of field burning.

The designated smoke sensitive areas in the Region are west of the Cascade crest with only one exception — Spokane, Washington, and special consideration given to the orchard areas of Okanogan, Chelan, Douglas, Kittitas, Benton, and Yakima Counties in Washington. In western Washington, the designated areas are continuous from the Canadian border south along the east side of Puget Sound to Vancouver. In addition, there is Port Angeles and the area around Grays Harbor on the south central coast. In Oregon, the entire Willamette Valley is included. In addition, there is Coos Bay, Roseburg, Grants Pass, and the entire Rogue Valley. The Forests affected by the smoke management plans are all the Westside Forests in both States plus the Deschutes National Forest.

The State governments play a critical role in regulation and enforcement of air quality. Congress has decreed that the prevention and control of pollution at its source are the responsibilities of State and local authorities. The Environmental Protection Agency must approve all State Implementation Plans (SIP) for adequacy and compliance with Federal law and standards, but States are essentially free to do the job as their officials see fit. Standards set by a State can be more restrictive than those of the Federal government.

Trends

To manage smoke generated by agricultural and forestry burning, a Memorandum of Agreement was signed in 1968 by State, Federal, and private fire control agencies and the Oregon Department of Environmental Quality to initiate "a cooperative slash/smoke management plan to minimize or eliminate slash/smoke accumulation in designated areas of high population density." The State Forester serves as coordinator since he already has the legal authority to control open burning on forest lands. During 1971, a similar smoke management program was developed for the State of Washington. The Washington smoke management plan is administered by the Department of

Natural Resources with technical assistance provided by the Department of Ecology.

In addition to the previously discussed smoke management plans, the Clean Air Act (P.L. 88-206), as amended, provided for the establishment of National Ambient Air Quality Standards (NAAQS) for pollutants. Sampling of the air in the Pacific Northwest identified "nonattainment" areas, (i.e., areas in violation of NAAQS standards). These nonattainment areas closely correspond to the designated smoke sensitive areas.

In 1977, the Clean Air Act (CAA) was amended to provide protection of air quality specifically in rural areas and charged Federal land managers with an "affirmative responsibility" to protect the air quality related values of Class I areas. The amendments established a separate set of air quality standards to augment the NAAQS. The Class I, II, and III designations of areas specify the maximum allowable *increases* in concentrations of sulphur dioxide and particulates above levels existing on August 7, 1977. Class I areas are those where anything but the slightest reduction of air quality is disallowed as defined in State smoke management plans.

In addition to objectives for smoke management and specific pollutants, a third type of air quality indicator is visibility. Although the 1977 amendment provides for protection of visibility, it will not be addressed in this plan because regulations for visibility are currently being developed.

Prior to the end of 1981, visibility standards for Class I areas should be promulgated. Future developments are expected to emphasize specific air quality standards and tighter restrictions on polluting activities. Current activities emphasize increased monitoring to determine compliance with standards.

Relevant Issues

A primary issue is stated as: "Should the Forest Service continue to depend upon prescribed burning to dispose of logging debris, reduce the wildfire hazard, and to recycle nutrients and prepare sites for reforestation?"

Limiting Factors

The lack of specific data to fully plan management of air quality is a limiting factor.

Opportunities

Management opportunities to address the air quality issue are:

- a. To control the size of residues (the smaller the material, the less burning time required and the less residual smoke); and
- b. To control the amount of residues through improved utilization programs. The increased use of residues for firewood, however, may increase problems by concentrating smoke in urban areas.

Lands — Intermingled Ownerships

Description

Lands is a support program to assist in land management planning, identify National Forest System ownership, and provide landownership adjustments, rights-of-way acquisition, land use administration and multi-resource studies. The driving force for the program is the large amount of intermingled ownership within the Region.

There are approximately 2.7 million acres of land in non-Federal ownership intermingled with the National Forest lands of the Pacific Northwest Region. The amounts of non-Federal ownership varies from 2 percent on the Mt. Baker and Okanogan National Forests to 30 percent on the Fremont National Forest.

The National Forests are managed for a variety of purposes to satisfy both short-and long-term public needs. In recent years, there have been increasing demands for the use and occupancy of intermingled lands within the National Forests. As each party began to utilize its resources, it became apparent that management philosophies and objectives differed. Management practices or uses on other lands can affect National Forest resource management and, conversely, National Forest management can have impacts on private lands.

An example of contrasting uses is the increasing demand for mountain subdivisions or recreation homesites in areas of public lands managed for multiple use. An initial impact is the demand to utilize the public lands for access, utility routes and water supply. Once established, the occupants often oppose any Forest Service management activity that affects their use or enjoyment of the adjacent public lands such as timber harvesting, wildlife habitat improvement and recreation development. The occupancy and use of the private lands also cause environmental impacts by affecting big game areas, other wildlife habitat needs and increased hazards for incidence of wildfire. Differing management practices can also affect National Forest management options. Private logging practices often create adverse impacts on visual resources, fish and wildlife habitat, air and water

quality, cultural resources and slash disposal. These are particularly critical in large areas of checkerboard ownership. Public objectives for scenic routes cannot be met unless the entire route is managed for its aesthetics. Increased stream sedimentation and higher water temperature from surface disturbance and removal of the timber overstory adversely affect the adequate resource. Removal of old-growth wildlife habitat on the private lands puts an additional impact for maintaining the habitat on public lands. The transportation system can be overloaded through activities of both owners at the same time.

Trends

The Forest Service has taken the position that any control over private land use decisions is properly exercised by the States or counties. Working with local governments has been one of the most fruitful ways of making management of intermingled ownerships more compatible. The Forest Service will continue to emphasize local government control over uses on private lands.

The Region has had an active land exchange program that has helped to solve some of the problems of intermingled ownership. Since 1920, about 1,600,000 net acres of intermingled land have been added to the National Forests System through the exchange program.

Land exchange is an alternative that can reduce the problem of intermingled owners but may not solve some of the problems of adjacent owners. Purchase of controlling interests in land to prevent use conflicts are used in certain areas such as National Recreation Areas and Wild and Scenic Rivers.

Relevant Issues

The management objectives of National Forest lands and intermingled ownerships are usually different. While the Forest Service may find it is in the public interest to control uses of certain resources for the public benefit, other owners may not limit uses that are not seen as detrimental to the individual owner's primary objectives. Practices on those lands can affect National Forest resource management options. Areas of potential management conflict include:

- a. Wilderness — Timber harvesting on private lands can impair the wilderness character on adjacent public lands.
- b. Timber Harvest — Timber harvesting on other ownerships may limit options for harvest on adjacent National Forest lands.
- c. Homesite Development — Subdivision and development for recreation homesites presents a range of problems from timber harvesting to fire,

insect, and disease management and related activities.

Areas east of the Cascades that are near major transportation routes, experience the greatest impact from recreation subdivisions. The drier climate and the opportunities for both summer and winter recreation uses attract many users from the more populated westside. These types of uses are more prevalent on the Deschutes, Wenatchee, and Okanogan National Forests.

Intermingled National Forest ownerships on the western slopes and crests of the Cascades, experience greater impact from timber harvesting practices because of the broken, rough terrain and heavy rainfall which contribute heavily to potential soil erosion. Thus, the Snoqualmie, Wenatchee, Gifford Pinchot, and the Willamette National Forests have greater potential for this type of problem.

Limiting Factors

Landownership management planning is limited by the following factors:

- a. Resistance by local government to increased Federal controls through acreage increases, or limitation of tax base by substitution of federal control for local governmental control;
- b. Private nonindustrial landowners are likely to have diversified land management objectives. Owners may be reluctant to modify practices that would adversely affect net cash flow or other objectives;
- c. Lack of authority to enter into cooperative agreements to provide uniform, coordinated management objectives;
- d. Reluctance of owners to accept land appraisal values;
- e. Inability to consolidate ownership through disposal of isolated parcels of National Forest Land that have potential resource value (e.g., cultural, fish and wildlife habitat).

Opportunities

Opportunities to address issues resulting from intermingled ownerships are:

- a. For local land use and coordinated Forest resource planning;
- b. For Cooperative management agreements with other Government agencies and landowners;
- c. For assistance to adjacent owners to reduce liability or cost of public use of private lands; and
- d. To modify National Forest objectives to compensate for the management activities on other intermingled ownerships (e.g., Bull Run Watershed).

The initial step to resolve the problem of intermingled ownership is to insure that landownership planning is considered in forest plans. Regional direction for long-range land adjustment plans (landownership planning) is contained in the Forest Service Manual. This direction provides that forest plans will include an appropriate level of landownership planning.

Human Resource Programs

Description

Involvement with Human Resource Programs in the Pacific Northwest Region dates back to the thirties when the well-remembered Civilian Conservation Corps was formed. This program lasted until the beginning of World War II, when it was phased out. There were no Human Resource Programs as we know them now until about 1960 when the accelerated Public Works Programs (which were devised to meet high unemployment), administered by the Department of Commerce, came into being. These lasted for a very short time only. About 1964, several programs were started under the Manpower Development and Training Act. A few Forests became involved in its programs, but on a limited basis. Next to appear were programs such as Job Corps, which began in 1965, when several Job Corps Conservation Centers were established on the Region's National Forests. Other programs such as the Neighborhood Youth Corps came into being about this time also. In 1970, the Youth Conservation Corps was established and the Forest Service was directed, along with the Department of Interior, to administer and operate it. The Older Americans Act established Operation Mainstream (now known as the Senior Conservation Employment Program) shortly thereafter. In 1973, the Comprehensive Employment and Training Act (CETA) was passed which brought many Human Resource Programs together under one legislative umbrella and under the administrative jurisdiction of the Department of Labor. Authorization for additional training and employment programs was also established under CETA at that time. As more money became available to local CETA prime sponsors, they began to look more and more to the Forest Service to host various programs.

In 1975, a 7 percent unemployment rate for an extended period of time triggered the Title X Job Opportunities Program and a large amount of money was given to the Forest Service to reduce unemployment in rural areas. In 1978, the Young Adult Conservation Corps Program was established as Title VIII of CETA and the Forest Service and Department of Interior were directed to administer the program.

During fiscal year 1979, over 5,000 people were employed in all Human Resource Programs in the Region. This translates into nearly 2,500 person years of work accomplished on the Forests which was valued at over \$25,000,000.

At present, the Region is involved in the following Human Resource Programs:

- a. Job Corps;
- b. Youth Conservation Corps (YCC);
- c. Young Adult Conservation Corps (YACC);
- d. Senior Conservation Employment Program (SCEP);
- e. CETA Hosted Programs — Titles I, II, III, IV, and VI. (These programs are quite varied, consisting of both adult and youth programs, training and employment programs, and cover a broad spectrum of target groups such as Indians, migrant workers, unskilled, and unemployable);
- f. Volunteers in the National Forests;
- g. Title X, Job Opportunities Program (Not now active, but would be if national unemployment rate hits 7 percent or more for three consecutive months); and
- h. Other miscellaneous programs such as College Work Study (CWS) and Work Incentive Programs (WIN).

Trends

Human Resource Programs in the Pacific Northwest Region provide an important source of labor for the accomplishment of high priority and otherwise unfunded resource management projects. In times of restricted personnel ceilings, shortages of funds, etc., they become even more important. There are some restrictions and problems involved, however. Human Resource Programs may not be used to displace employees or to do work already funded. Since funding for many of the programs comes from other agencies and funding levels are subject to outside political pressures and changing socio-economic conditions, it is difficult to make long-term plans for utilization of some programs. Unless economic conditions now existing in our country drastically improve, it is quite likely that Human Resource Programs will continue to exist in some form for the foreseeable future. The Forest Service will probably continue to be called upon to operate programs, since it has the capability to provide rural employment and training opportunities that exist on the National Forests, and the expertise and organization necessary to administer and host such programs.

Limiting Factors

Limiting factors include the following:

- a. Funding for human resource programs is

discontinuous and dependent upon fluctuation in the national economy, so managers cannot rely on human resource programs to accomplish critical projects;

- b. Housing facilities to accommodate fluctuating programs are inadequate; and
- c. There is a lack of trained manpower specialists on National Forests.

Opportunities

There is an opportunity for improved coordination between State-managed dollars and people and National Forest System jobs and manpower specialists.

Management Situation and Assessment — State and Private Forestry

Introduction

The Forest Service, through its State and Private Forestry programs (S&PF), offers financial, technical, and related assistance to State forestry organizations and others in support of improved forest resource management, protection and planning. Forest Service programs include:

- Rural forestry assistance on non-Federal forest lands;
- Integrated pest management on all forest lands;
- Urban forest assistance in urban areas;
- Rural fire prevention and control on non-Federal forest lands and other rural lands;
- Management and planning assistance to State Foresters or equivalent State officials; and
- Assistance to insure that new forestry technology and research results are promptly made available and implemented.

State and Private Forestry also includes certain programs funded by other Federal agencies but administered by the Forest Service. These are:

- Cost-sharing for reforestation and timber stand improvement (Agricultural Stabilization and Conservation Service);
- Watershed planning and restoration and flood prevention (Soil Conservation Service); and
- Rural and community fire protection (Farmers Home Administration).

State forestry agencies are the principal delivery system for S&PF cooperative forestry programs. The Cooperative Forestry Assistance Act (P.L. 95-313) is the basic legislation authorizing the Secretary of Agriculture to cooperate with and assist the States in implementing Federal programs affecting non-Federal forest lands.

Pacific Northwest Region

The Pacific Northwest Regional State and Private Forestry Program mission is to assist each State and National Forest in developing effective and efficient forest production, management, and utilization practices, while simultaneously strengthening the image and capability of each State to manage its forests and related resources. This assistance and support is provided through three major program areas.

Cooperative Fire and Forestry

Provides technical and financial assistance to forest landowners primarily through the State Forestry Departments. The purpose is protection of forests and associated resources from fire and the fostering of multiple-use management so as to achieve the optimum potential of forest resources. Activities to achieve this goal include assistance in preparation of forest land management plans, assisting woodland owners and, the dissemination of current research and technology.

Another front for achievement of resource goals is work with forest industry, consultants and the State Forestry agencies in both States in sawmill improvement analysis to extend the available supply of timber. Other technical assistance in these fields include logging systems analysis, demonstrations of advanced systems, improved marketing, harvesting including directional falling, and quality control workshops for primary processing of forest products.

Cooperative fire programs provide both States financial and technical assistance to insure adequate resource protection of State and private forest lands. Important aspects of this are assistance in the training of personnel in fire protection work and the initiation and negotiation of cooperative agreements between the Forest Service and States for mutual assistance.

Forest Pest Management

Provides leadership and technical services to National Forests, other Federal agencies, States and private landowners in managing forest pests. The objective of Forest Pest Management is to reduce damage and losses caused by pests on forest lands to levels compatible with forest resource and other environmental values. Leadership is provided in the Integrated Pest Management (IPM) process to maximize pest management effectiveness and efficiency while minimizing adverse impacts on the environment.

State Forestry Departments are provided financial support to help maintain staffs of professional pathologists and entomologists. Financial assistance is also provided to States for pest prevention and

suppression programs on State and private forest lands.

Activities of the Forest Pest Management Staff include the following:

- a. Providing technical expertise in forest pest management;
- b. Assessing pest caused resource losses;
- c. Predicting pest trends;
- d. Determining the need for prevention and suppression treatments;
- e. Training and demonstrating to forest resource managers integrated pest management techniques;
- f. Monitoring the effectiveness of pest management practices;
- g. Coordinating pesticide use;
- h. Placing new pest management technology into use;
- i. Providing technical backup to State forest pest management personnel;
- j. Identifying pest research needs; and
- k. Interfacing with the forest land and resource management planning process.

Area Planning and Development

Provides planning support to States, other Federal agencies and units of local government for the protection and management of natural resources. The purpose is to retain forest lands in a highly productive state that will provide a continuing supply of quality forest products. The staff is also responsible for coordinating state and private forestry programs with National Forest planning. This includes long-range interagency planning, soil and water management assistance, technical and financial assistance to State agencies and the development of projects for economic assistance to rural communities. Cooperative soil and water technical assistance includes development of interagency river basin plans, Columbia River multi-State studies, multi-purpose watershed projects conducted by the Dept. of Agriculture and other Federal agency plans which involve forest lands. Area planning and development staff participate in emergency planning which encompasses natural disaster planning, emergency flood prevention planning and coordination, and assisting in the implementation of projects for the containment of contaminant substances. The unit also provides technical and financial assistance to the Oregon and Washington State foresters to help them develop long-range plans for the state and privately owned forest lands in their states. This encourages them to develop forest resource plans which will provide a basis for the effective consideration of forestry and forest lands in other Federal, State, county and local planning.

**TABLE 12—Projected State and Private Forestry Program Outputs, Activities, and Costs—1980 RPA Program
Pacific Northwest Region**

Program Element and activity	Unit of Measure	Annual Units									
		1981	1982	1983	1984	1985	1986- 1990	1991- 2000	2001- 2010	2011- 2020	2021- 2030
Recreation											
Cooperative Technical Assistance for Dispersed Recreation	Thousand Acres	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04
Wildlife & Fish											
Cooperative Technical Assistance for Wildlife Habitat Improvement	Thousand Acres	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Range											
Cooperative Technical Assistance for Forage Production	Thousand Acres	0.8	0.9	1.1	1.3	1.5	1.5	1.5	1.6	1.6	1.6
Timber											
Reforestation (RFA, FIP, ACP)	Thousand Acres	5.8	9.6	10.0	11.3	11.8	12.5	13.7	15.4	16.6	17.4
Timber Stand Improvement (RFA, FIP, ACP)	Thousand Acres	11.6	15.4	16.4	18.1	19.1	19.6	20.8	21.0	21.4	21.8
Timber Prepared for Harvest	Million Cubic Feet (MMCF)	36.0	40.9	45.9	50.8	55.8	55.8	55.8	57.0	58.5	60.0
Woodland Owners Assisted	Thousand Owners	2.7	3.3	3.9	4.5	5.2	5.3	5.4	5.4	5.4	5.5
Improved Utilization of Wood	Million Cubic Feet (MMCF)	18.0	21.2	24.5	27.7	31.0	34.0	38.0	42.5	47.0	51.0
Protection											
Insect & Disease Management Surveys	Million Acres	31	32	35	38	39	40	40	41	41	41
Rural Community Fire Protection	Thousand approved applications	—	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.12	0.12
Fire Loss on Protected Area	Thousand acres burned	17.4	15.3	14.6	14.1	13.2	13.2	13.2	13.2	13.2	13.2
Water, Minerals, Lands and Soils											
State Forest Resource Planning	Million acres	1.8	2.0	3.0	5.4	6.0	6.0	6.0	6.0	6.0	6.0
Cooperative Technical Assistance for Landowner Forest Management Plans	Million acres	0.18	0.20	0.23	0.26	0.29	0.26	0.21	0.21	0.21	0.21
Cooperative Technical Assistance	Person years	1.0	1.5	2.0	2.5	3.0	3.0	3.0	2.5	2.5	2.5
Workforce	Thousand staff years	0.04	0.05	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.08
Costs State and Private Forestry											
Operational	Million dollars¹										
Capital Investments²	Million dollars										
Total Appropriated³	Million dollars	3.1	4.0	4.5	4.9	5.4	5.6	5.7	5.9	5.8	5.7
Allocated⁴	Million dollars	1.2	2.1	2.1	2.4	2.5	2.9	3.0	3.0	3.0	3.0
Total S&PF	Million dollars	4.3	6.1	6.6	7.3	7.9	8.5	8.7	8.9	8.8	8.7

see opposite page for footnotes

State and Private Forestry Programs

The 1980 RPA Program for S&PF in the Pacific Northwest Region is shown in Table 12. This program is based upon State data and information provided for the program alternatives in the 1980 RPA and established funding allocation procedures developed in cooperation with the National Association of State Foresters.

The State and Private Forestry future management situation for Oregon and Washington will be guided by the 1980 RPA National Program. They have tentatively been projected for each State based on current estimates. However, actual State objectives and proposed budgets will continue to be negotiated annually at the national level in accordance with the Cooperative Forestry Assistance Act (P.L. 95-313) and other agency authorities as required. The RPA targets for Oregon and Washington are displayed in Tables 13 and 14.

¹ All costs are shown in constant 1978 dollars.

² S&PF capital investments include such activities as: reforestation; timber stand improvement; preparation of landowner forest management plans; cooperative forest resource planning; insect and disease surveys; and fire management planning and fuel treatment.

³ Projected estimates of funds appropriated to the Forest Service for cooperative forestry assistance under P.L. 95-313.

⁴ Projected estimates of funds appropriated to other USDA agencies for programs which receive assistance from the Forest Service and State forestry agencies, including (1) forestry practices under the Agricultural Conservation Program and the Forestry Incentives Program funded through the Agricultural Stabilization and Conservation Service; (2) Rural community fire protection funded through the Farmers Home Administration and (3) funds allocated to the Forest Service by the Soil Conservation Service for the forestry aspects of watershed planning, flood prevention, river basin surveys, and resource conservation and development.

TABLE 13—1980 RPA Program Display for the State of Oregon

Program Element and activity	Unit of Measure	Base Year 1978	Annual Units					
			1981	1982	1983	1984	1985	1995
Recreation								
Cooperative Technical Assistance for Dispersed Recreation	Thousand Acres		0	0	0	0	0	0
Wildlife & Fish								
Cooperative Technical Assistance for Wildlife Habitat Improvement	Thousand Acres		0	0	0	0	0	0
Range								
Cooperative Technical Assistance for Forage Production	Thousand Acres		0.8	0.9	1.1	1.3	1.5	1.5
Timber								
Reforestation (RFA, FIP, (ACP)	Thousand Acres		3.4	5.7	5.9	5.9	6.1	7.1
Timber Stand Improvement (RFA, FIP, ACP)	Thousand Acres		9.7	12.9	13.8	14.3	15.1	16.4
Timber Prepared for Harvest	Million Cubic Feet (MMCF)		16.9	19.2	21.6	23.9	26.2	26.2
Woodland Owners Assisted	Thousand Owners		1.5	1.6	1.9	2.2	2.5	2.5
Improved Utilization of Wood	Million Cubic Feet (MMCF)		5.0	5.9	6.9	7.8	8.7	11.4
Protection								
Insect & Disease Management Surveys	Million Acres		17.4	17.9	19.6	21.3	21.8	22.4
Rural Community Fire Protection	Thousand approved applications		0	0.044	0.044	0.044	0.044	0.048
Fire Loss on Protected Areas	Thousand acres Burned		7.0	6.2	5.8	5.6	5.3	5.3
Water, Minerals, Lands and Soils								
State Forest Resource Planning	Million acres		0.9	1.0	1.5	2.7	3.0	3.0
Cooperative Technical Assistance for Landowner Forest Management Plans	Million acres		0.13	0.15	0.17	0.19	0.21	0.21
Forests—State & Private								
Forestry	Thousand dollars		671.4	992.1	1,089.1	1,224.5	1,350.9	1,402.6
Appropriated Funds								
Allocated Funds	Thousand dollars		61.0	172.0	180.0	220.0	240.0	374.0
Total All Funds	Thousand dollars		732.4	1,164.1	1,269.1	1,444.5	1,590.9	1,776.6

* Funds are total of payments to State for production targets shown.

Table 14 — 1980 RPA Program Display for the State of Washington

Program Element and activity	Unit of Measure	Base Year 1978	Annual Units					
			1981	1982	1983	1984	1985	1995
Recreation								
Cooperative Technical Assistance for Dispersed Recreation	Thousand Acres		0.02	0.02	0.03	0.03	0.04	0.04
Wildlife & Fish								
Cooperative Technical Assistance for Wildlife Habitat Improvement	Thousand Acres		0.02	0.02	0.02	0.03	0.03	0.03
Range								
Cooperative Technical Assistance for Forage Production	Thousand Acres		0	0	0	0	0	0
Timber								
Reforestation (RFA, FIP, ACP)	Thousand Acres		2.4	3.9	4.1	5.4	5.7	6.6
Timber Stand Improvement (RFA, FIP, ACP)	Thousand Acres		1.9	2.5	2.6	3.8	4.0	4.4
Timber Prepared for Harvest	Million Cubic Feet (MMCF)		19.1	21.7	24.3	26.9	29.6	29.6
Woodland Owners Assisted	Thousand Owners		1.2	1.7	2.0	2.3	2.7	2.9
Improved Utilization of Wood	Million Cubic Feet (MMCF)		13.0	15.3	17.6	19.9	22.3	26.6
Protection								
Insect & Disease Management Surveys	Million Acres		13.6	14.1	15.4	16.7	17.2	17.6
Rural Community Fire Protection	Thousand approved applications		0	0.056	0.056	0.056	0.056	0.062
Fire Loss on Protected Areas	Thousand acres Burned		10.4	9.1	8.8	8.5	7.9	7.9
Water, Minerals, Lands and Soils								
State Forest Resource Planning	Million acres		0.9	1.0	1.5	2.7	3.0	3.0
Cooperative Technical Assistance for Landowner Forest Management Plans	Million acres		0.05	0.05	0.06	0.07	0.08	0.07
Forests—State & Private Forestry								
Appropriated Funds	Thousand dollars		646.8	970.0	1,109.0	1,254.6	1,402.5	1,464.0
Allocated Funds	Thousand dollars		34.0	155.0	165.0	212.0	263.0	403.0
Total All Funds	Thousand dollars		680.8	1,125.0	1,274.0	1,466.6	1,665.5	1,867.0

The major thrust in the 1980 RPA State and Private Forestry Program is the production of wood. The best opportunities to increase softwood supplies are on private nonindustrial forest land. The leveling off of harvest from industrial land emphasized the importance of nonindustrial private land. It is here that much of the increased demand for softwood would be met through increased harvest and reforestation.

Technical assistance to timber growers in the Pacific Northwest would concentrate on regeneration following harvest, stand improvement, and marketing. Special efforts would be to use genetically improved planting stock. The goal is to boost reforestation from the current level of nearly 6,000 acres per year to more than 11,500 acres by 1985, and nearly 17,500 acres by 2030. Increases in acreage receiving cultural treatment would follow a similar pattern: to nearly 19,000 acres by 1985 and 22,000 acres by 2030.

Estimated additional wood volume available through improved utilization would increase to 31 million cubic feet by 1985 and 51 million cubic feet by 2030. Existing technical assistance programs, various financial incentives and other alternatives would be studied to determine how nonindustrial private landowners can most effectively be encouraged to produce timber and other renewable resources.

S&PF allocations to States are made on the basis of laws, formulas and other specific agreements with the Committee of State Foresters as required by the Cooperative Forestry Assistance Act.

During formulation of the National RPA Program, Regional alternatives were jointly developed by the Forest Service, the Oregon Department of Forestry and Washington's Department of Natural Resources. The alternatives were based on State issues as identified at

Table 15 – The Relationship of the S&PF Program Elements to Regional Issues

Regional Issues	Program Elements													
	Coop. Tech. Assist. for Dispersed Recreation	Coop. Tech. Assist. for Wildlife Habitat Imp.	Coop. Tech. Assist. for Range Improvement	Reforestation	Timber Stand Improvement	Timber Prepared for Harvest	Woodland Owners Assisted	Improved Utilization of Wood	Insect & Disease Mgmt. Surveys & Tech. Asst.	Rural Community & Fire Protection	Fire Loss on Protected Area	State Forest Resource Plan	Landowner Forest Management Plans	Cooperative Technical Assistance
Riparian Areas		W	X						X			X		
Outdoor Recreation	W													
Municipal Water Supply									X		X	X		
Timber/Range vs. Wildlife			X		X								X	
Air Quality and Smoke Management										X	X			
Threatened & Endangered Species		W											X	
Anadromous Fish Habitat		W											X	
Use of Chemicals					X				X	X	X			
Timber Supply				X	X	X		X	X	X	X	X		
Intermingled Ownerships									X	X			X	
Old Growth Timber									X					
Private Forestry	W	W	X	X	X	X	X	X	X	X	X	X	X	X

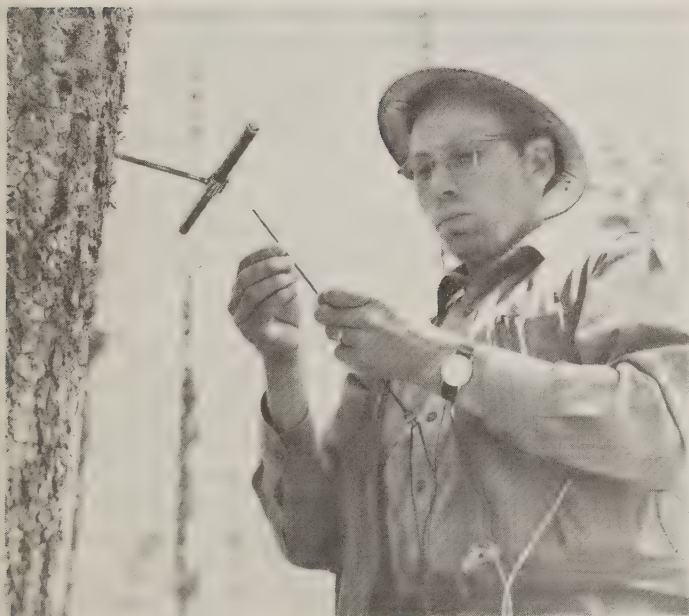
X = Oregon and Washington Activities

W = Washington Activities Only

that time by the State Forester. The Chief's subsequent S&PF target assignment to the Region is within the range of alternatives developed. Therefore, the assignment has an intrinsic relationship to those State issues.

The relationship of S&PF program elements to Regional issues is shown in Table 15. In addition, the S&PF program has a relationship to National Forest Management concerns relating to fire policy, National Forest share of recreation supply, diversity, and cultural resources.

State Forest Resource planning plays an essential part in the development of the RPA Assessment and Program. The States of Oregon and Washington are in the process of preparing State Forest Resource plans which will provide an inventory of forest resources, a statement of State issues and concerns and the State Forester's proposed program. These plans, which are scheduled for completion in 1983, will provide valuable information and coordination in preparing the 1985 RPA National Program. Further coordination with State and local agencies and landowners will occur at the local level as part of the Forest Service forest planning process.



Research in the Pacific Northwest Region provides a scientific basis for management of the National Forests.

Management Situation and Assessment — Forest and Range Research Programs

The objective of the Forest Service research program is to provide the scientific basis for the management and use of the Nation's renewable natural resources. Research is conducted through a network of eight regional Forest Experiment Stations and the Forest Products Laboratory at Madison, Wisconsin. Field studies and laboratory research are conducted at 81 locations throughout the United States, Puerto Rico, and the Pacific Trust Islands. The basic unit for conducting research within a Station is the research work unit. Each unit operates under a work unit description (charter) for a period of up to 5 years. The charter may be revised or terminated prior to that time if research priorities shift.

National research planning is intended to satisfy several needs. First, it provides a guide for forestry research planning in the Forest Service, Science and Education Administration (SEA), and the participating forestry schools as required by Title XIV of the Food and Agricultural Act of 1977. Second, it provides the research portion of the RPA program. And third, it provides a guide for coordinated annual program development among Forest Service, Cooperative Research of SEA, the university community, and others.

Research programs are planned jointly with the Nation's 61 forestry schools to promote more efficient use of research talents and facilities. The Forest Service in conjunction with the forestry schools and Cooperative Research of SEA conducted several regional and a national research planning sessions during 1977 and 1978 to identify research needs. This effort, which involved more than 1,000 research users, led to the publication of both national and regional research plans. These plans resulting from USDA's research planning system formed the basis for developing the 1980 RPA research program alternatives.

For RPA purposes, the following criteria were used to evaluate the RPA research alternatives:

- Responsive to needs for which technology is inadequate;
- Contributes to increased national productivity;
- Response to national policies, particularly those enunciated by the Administration and Congress; and
- Relates to changes in demand for technology but recognizing that the course of research should not shift drastically from historical trends.

In the 1980 RPA Program, research priorities were placed on:

- Improving wood utilization;
- Developing more intensive forest management practices to increase the Nation's timber supply and to provide biomass for energy;
- Providing new knowledge to deal with current and anticipated environmental issues such as range, arid land, wildlife management, and tropical forestry;
- Increasing the land manager's stewardship capability in areas such as protection and pollution control; and
- Resolving problems identified through the Regional and Forest planning process.

The present and proposed research program for the Pacific Northwest Experiment Station is described below. Table 16 summarizes the research program. Portions of research programs by other Forest Experiment Stations and universities relevant to this plan are also highlighted below. Additional information is available from these organizations.

Future research planning will continue to be conducted under the auspices of Title XIV and the Renewable Resources Planning Act. Research needs identified through the State, Forest, and Regional Plans will be incorporated into future research planning.

Forest Service research in the Pacific Northwest Region is planned and conducted by the Pacific Northwest Forest and Range Experiment Station, headquartered in Portland, Oregon. The Pacific Northwest Station is one of eight Regional Stations which together with the Forest Products laboratory are

charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

Most of the research conducted by the Pacific Northwest Station contributes directly to the solution of problems for the National Forest Systems and State and Private Forestry programs of the Pacific Northwest Region.

The Station also conducts research in other States, principally Alaska and California. In addition, research conducted by other Stations and the Forest Products Laboratory (the Forest Service's national center for wood utilization research) may be applicable to resource problems in the Pacific Northwest Region. The Pacific Northwest Station also cooperates with many private individuals, industrial firms, schools, associations, and agencies of State and Federal governments. These cooperators provide skills, services, and facilities that greatly augment and speed the research program.

The research effort of the Pacific Northwest Station is to acquire the knowledge, develop the technology, and disseminate the research findings required to manage Pacific Northwest forest and range resources in ways that satisfy demands for goods and services while maintaining a quality environment. Field and laboratory research is carried out by teams of scientists located at Forest Service laboratories in Washington, Oregon, and Alaska. Each team or unit is organized for the

Table 16 — RPA Research Program for PNW Forest and Range Experiment Station Scientist Years (SY) and Investments (Thousands of Dollars¹)

RPA Element	1981 ² SY	M\$	1985 SY	M\$	1990 SY	M\$
Recreation	2.0	186	5.4	600	6.5	800
Wilderness	0	0	0.4	100	0.5	100
Wildlife and Fish	11.7	1,446	30.0	3,300	37.2	4,300
Range	5.0	650	5.4	600	5.4	600
Timber	40.7	3,658	67.7	6,700	79.0	8,300
Water	14.2	1,212	20.5	2,280	25.6	2,950
Protection	30.9	3,970	44.4	4,900	51.6	6,000
Lands	18.0	3,070	48.9	5,600	57.5	7,400
Soils	1.0	108	4.0	420	4.0	450
SY Total	123.5		226.7		267.3	
M\$ Total		14,300		24,500		30,900

¹ Constant 1978 dollars

² Based on actual appropriation

efficient solution of specific recognized problems. The problems under study at the Pacific Northwest Station are selected with the assistance of land managers, various public agencies, land use planners, policy makers, environmental groups, and other research organizations. Research results are widely distributed to individuals and State, Federal, and private organizations through publications, workshops, seminars, and consultation.

In the Pacific Northwest Region, Forest Service research is conducted by units located at the Portland, Oregon headquarters and at field research laboratories located at Seattle, Olympia, and Wenatchee, Washington; and at Corvallis, Bend, and La Grande, Oregon. On some National Forests in the Pacific Northwest Region there are forest and range areas specially designated for research activities.

These areas are:

- Wind River Experimental Forest, Carson, Washington
- Entiat Experimental Forest, Ardenvoir, Washington
- Cascade Head Experimental Forest, Otis, Oregon
- H.J. Andrews Experimental Forest, Blue River, Oregon
- South Umpqua Experimental Forest, Roseburg, Oregon
- Pringle Falls Experimental Forest, La Pine, Oregon
- Bull Run Experimental Watershed, Sandy, Oregon
- Starkey Experimental Forest and Range, La Grande, Oregon

In addition, Research Natural Areas on National Forests and other public lands protect undisturbed examples of forest and rangeland resources. These areas provide an important information base for gauging effects of management practices on other land. Efforts are continuing to identify suitable areas and formally establish them within the Research Natural Area system.

Current Forest Service research programs in the States of Washington and Oregon are described as follows:

Recreation

Research emphasizes development of methods for recreation planning and management for both developed and dispersed recreation resources use. Examples include procedures for assessing the recreation opportunities spectrum, controlling vandalism, and managing noise in recreation environments. Studies of recreation use patterns and the relationship of such use to other resource impacts are utilized to assist recreation management. These studies provide information such as the impacts of

recreation activities on water quality and the relationship between recreational activities and wildlife patterns in dispersed areas.

Wildlife and Fish

Wildlife habitat research focuses on evaluation of forest and grassland habitats and development of procedures for use by resource managers in assessing habitat qualities and wildlife diversity. Game and non-game habitat relationships are determined, as are big game-livestock forage use interactions.

Livestock grazing, timber harvest, and other land use impacts on anadromous fish habitat are primary research activities. Effect of natural organic debris in streams on the stream ecosystem and impact on fish production of materials deposited in streams by landslides are facets of a research program concerned with learning how to protect and rehabilitate anadromous fish habitats. Recovery of fish habitat in streams impacted by Mt. St. Helens' eruptions is under study. Research needs for the northern spotted owl and its habitat have been identified in Appendix B.

Range

A cooperative range evaluation activity includes research to determine the integrated responses to forested range improvement practices and management. These responses include forage productivity, water yield and quality, wildlife populations, wood yield, visual quality, and the sociological and economic impacts on rural households and communities. Related work focuses on grassland succession and ecology, symbiotic nitrogen fixation and range productivity, and on livestock management systems, including systems which protect riparian environments.

Timber

Intensive culture of the principal commercial timber species of the Pacific Northwest is the overall goal of a broad mix of genetic and silvicultural research activities. Genetic research focuses principally on Douglas-fir and western hemlock to relate genetic characteristics to site conditions and to develop seed orchard procedures that will increase production of superior stock for reforestation. Improved nursery and planting practices are emphasized along with work to evaluate alternative practices for management of competing vegetation. Silvicultural research on Douglas-fir and related westside species is concerned with growth and yield as influenced by factors such as

spacing, species mixes, and fertilization treatments, including use of nitrogen-fixing species. In work on ponderosa pine and mixed conifers east of the Cascades, current research is investigating productivity in shelterwood systems and interactions associated with use of prescribed fire — impacts on vegetation, soil, nutrients, insects, diseases, wildlife, and soil flora and fauna. Research is determining the ecological characteristics of Pacific Northwest species as a basis for judging productive capacities of forest lands, including those not normally classified as commercial forest lands. Vegetation succession studies are underway in the area devastated by Mt. St. Helens' volcanic eruptions.

Energy potential of regional timber resources is the subject of research investigating methods and costs involved in making available and using wood for fuel. Biomass inventory, harvesting costs for insect-killed timber, procedures to reduce logging residue creation, and impacts of residue removal are investigated. In a related effort, utilization research concentrates on the relationship to product recovery of the changing size and quality of the western softwood resource, new processing technology, non-traditional product mixes, and different timber measurement systems. Current work is focused on the product potential of dead softwood timber in terms of volume and value losses related to time since death, environmental conditions, and products produced.

Forest engineering research is directed toward improvements in cable logging systems to obtain maximum utilization of the region's timber resource. Some of this work involves improved design and use of yarding carriages and rigging, multispan supports, and artificial anchors. Related work is on residue handling and transport systems. Other engineering research is developing planning aids that will help timber resource managers and loggers obtain the optimum combination of logging system, road location, span length, and yarder location for a given timber harvest area.

Water and Soil

Effects of various land management activities on soil and water resources are determined through research on managed forest and rangeland watersheds both east and west of the Cascades. Current work includes research on nutrient levels and streamflow responses to defoliation, indicator flora for soil climate documentation, and effects of fire on water yields. Related work is concerned with effects of timber cutting on water flows, mass soil movements, and the relation of woody debris to stream channel operation

— channel form and flow characteristics. Numerous studies of erosion action and changes in water yield and quality are underway in the Mt. St. Helens' blast zone. Research continues to determine effects of introduced chemicals on water quality and fish populations.

Protection

Fire research is concentrated on management of forest fuels, including natural residues and those created by man's activities. Impacts of and procedures for use of prescribed fire are emphasized. Other research on residue management includes determination of the effects of alternative residue treatments, development of systems for predicting and measuring forest residues and appraising forest fire hazard, and formulation of guidelines for residue management. Air resource management needs are addressed by research on air quality impacts of using fire as a management tool.

Forest insect research is aimed at providing components of integrated pest management systems. Biological control strategies are emphasized with attention given to insect parasites and arthropod and bird predators, as well as development of natural insect pathogens for use as microbial pesticides. Development of behavioral agents (pheromones) is directed toward insect population monitoring and control programs. A cooperative research and development program with Canada is working on integrated pest management strategies for the western spruce budworm.

Alternative treatments to lessen the impacts of root rots, heart rots, and dwarf mistletoes on western timber species are sought through forest disease research. Evaluation of impacts of tree wounding during harvesting is a facet of this work. In related research, better understanding of and methods to manipulate the beneficial effects of mycorrhizal fungi are sought, with special attention being given to nursery stock-fungi relations.

Forest Resources Economics and Evaluation

Forest economics research addresses the costs and related results of alternative public timber management policies and practices, including local and regional socioeconomic impacts. Examples are investigation of fertilization investments, costs of visual resource protection, Pacific Northwest production-price-employment-trade relationships, projections of economic systems operating in predominantly timber

regions, and effects on county expenditure patterns of Forest Service payments in lieu of taxes. Special emphasis is given to development of a method for projecting regional demand for National Forest stumpage and prices for individual species.

Related work is concerned with assessing price, employment, and other tradeoffs resulting from changes in world timber markets. Impacts of policies and procedures for selling National Forest timber are investigated.

Improved assessment of renewable resources is the overall objective of research now broadened from forest inventory to multi-resource evaluation. Development of techniques for and carrying out resource surveys in Washington and Oregon are part of this effort. Related evaluation work includes development of techniques to identify opportunities to improve market and nonmarket outputs through resource management, e.g., intensified timber production, through silvicultural manipulation of stocking. Periodically, employment/wood consumption ratios are developed to determine labor productivity changes and provide a basis for analyzing local area employment impacts of changes in timber supplies.

Need to Change Management Direction

The lands of the Pacific Northwest have the capability to supply a wide array of good, services, and amenity values. The previous discussions indicate that it is possible in most cases to change management direction and produce more of any single resource value. But such changes often cannot be made except at the sacrifice of some other resource values.

Most of the values that must be considered in making choices of future management direction exist today. The potential to harvest and grow timber exists as reflected in inventories and harvest plans. Lands supporting grazing, primitive type recreation, threatened and endangered species habitat, "old growth" timber, and scenic views all exist today as reflected in other inventories. These inventories, in addition to depicting what exists today, define the potentials for the future.

Although the potentials are present, the projected demands for future uses of these lands are frequently in conflict. The assessments of demand examined in previous sections indicate that strong pressures on the

resource base are a certainty. The breadth and intensity of public issues and management concerns also indicate that no issue can be resolved to the satisfaction of everyone.

The Regional RPA targets are at levels that are within technical, economic, and financial feasibility. However, it will not be feasible over time to meet these targets without giving up some of the resource values that exist today. Some of the values will also be given up over time if present management direction is continued. The choosing of how much and which values to give up can be made either by default or by decision.

Choices about these resource values should consider how they are distributed over time, their geographical distribution, and how capital investments can substitute for land in the production of some values.

In conclusion, this assessment indicates a need to change National Forest management direction to achieve a balanced output of goods, services and uses consistent with technical, economic, social and environmental feasibility. It also establishes the range of possible public choices that exist at present.

1951
1952
1953
1954
1955

1956
1957
1958
1959
1960

1961
1962
1963
1964
1965

1966
1967
1968
1969
1970

1971
1972
1973
1974
1975

1976
1977

1978
1979
1980
1981
1982

1983
1984
1985
1986
1987

1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030

2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
2048
2049
2050
2051
2052
2053
2054
2055
2056
2057
2058
2059
2060
2061
2062
2063
2064
2065
2066
2067
2068
2069
2070
2071
2072
2073
2074
2075
2076
2077
2078
2079
2080
2081
2082
2083
2084
2085
2086
2087
2088
2089
2090
2091
2092
2093
2094
2095
2096
2097
2098
2099
2100

2101
2102
2103
2104
2105
2106
2107
2108
2109
2110
2111
2112
2113
2114
2115
2116
2117
2118
2119
2120
2121
2122
2123
2124
2125
2126
2127
2128
2129
2130
2131
2132
2133
2134
2135
2136
2137
2138
2139
2140
2141
2142
2143
2144
2145
2146
2147
2148
2149
2150
2151
2152
2153
2154
2155
2156
2157
2158
2159
2160
2161
2162
2163
2164
2165
2166
2167
2168
2169
2170
2171
2172
2173
2174
2175
2176
2177
2178
2179
2180
2181
2182
2183
2184
2185
2186
2187
2188
2189
2190
2191
2192
2193
2194
2195
2196
2197
2198
2199
2200

2201
2202
2203
2204
2205
2206
2207
2208
2209
2210
2211
2212
2213
2214
2215
2216
2217
2218
2219
2220
2221
2222
2223
2224
2225
2226
2227
2228
2229
2230
2231
2232
2233
2234
2235
2236
2237
2238
2239
2240
2241
2242
2243
2244
2245
2246
2247
2248
2249
2250
2251
2252
2253
2254
2255
2256
2257
2258
2259
2260
2261
2262
2263
2264
2265
2266
2267
2268
2269
2270
2271
2272
2273
2274
2275
2276
2277
2278
2279
2280
2281
2282
2283
2284
2285
2286
2287
2288
2289
2290
2291
2292
2293
2294
2295
2296
2297
2298
2299
2300

Planning Direction

Introduction

Broad goals and planning direction for land and resource management plans are provided in the Renewable Resources Planning Act, the National Forest Management Act and the 1980 RPA Assessment and Program discussed in the introduction. As required by these Acts and program, specific direction for Regional and Forest planning has been developed in the Forest Service Directives system.

Many of the issues and concerns discussed in the Analysis of the Management Situation already have adequate direction to address them in the development of Forest Plans. Additional planning direction is provided in this Regional Plan to the forest planners for the following issues:

- a. Outdoor recreation
- b. Conflicts between timber and range management and wildlife habitat objectives
- c. Timber supply
- d. Energy
- e. Old-growth timber

Planning Direction to National Forests of the Pacific Northwest Region

Outdoor Recreation

The outdoor recreation issue can be described as: "How should the Forest Service allocate and manage National Forest recreation resources to meet increasing demands for outdoor recreation and minimize conflicts between various public and user groups?"

The issue consists of three facets as follows:

- a. How should the Forest Service recognize and manage National Forest visual resources to provide a pleasing experience for forest visitors?
- b. In terms of a range of opportunities for outdoor recreation, from modern-urban to primitive, there is an anticipated future supply shortage of primitive recreation experience areas in the Pacific Northwest Region.
- c. How can a balance between user conflict, user regulation, and needed facilities be achieved?

Planning Direction

- a. Forest Plans will deal with identification and analysis of the visual resources through guidance provided in Forest Service Manual chapter 1920, and more specifically FSM 1922.35b. Other references for planning National Forest visual resources include Forest Service Manual chapter 2380, Agriculture Handbooks 462 and 559.

- b. Forest Plans will follow instruction listed in FSM 1922.32a for all areas included in the RARE II process.
- c. Forest Plans will deal with identification and analysis of the recreation resource through guidance provided in FSM 1922.35a.
- d. The following National Forests will, in at least one alternative, look for opportunities and examine the effects of providing a primitive or semiprimitive nonmotorized recreation experience for 12 to 16 percent of their total anticipated recreation demand: Deschutes NF, Gifford Pinchot NF, Mt. Baker-Snoqualmie NF, Mt. Hood NF, Okanogan NF, Rogue River NF, Wenatchee NF, and Willamette NF. These opportunities can be provided by any combination of existing wilderness, scenic areas, presently undeveloped areas or any other area that meets the criteria as outlined in the Recreation Opportunity Spectrum.
- e. National Forests should review the document, A Recommended Renewable Resources Program, FS-346, September 1980 update (pages 34-37), for assumptions about recreation use management on National Forests during the forthcoming planning period.

By aggregating various Forest Plan alternatives, this issue can be analysed and addressed on a Regional basis in the next cycle of planning.

Conflicts Between Timber and Range Management and Wildlife Habitat Objectives

The total number of livestock grazing on the National Forests in the Pacific Northwest Region has remained relatively constant through the past ten years.

During the same period, elk populations have increased. Timber harvest, resulting in increased carrying capacity for elk (and livestock) on summer ranges, has been a contributing factor in elk increases. In some locations, the level and patterns of timber harvest have reached, and perhaps exceeded, the level at which elk habitat is improved and the habitat may be adversely impacted.

Use of the range by the present total combined number of livestock and elk is causing damage to vegetation in some areas, particularly on winter ranges. This situation is most apparent in northeast Oregon.

Oregon Department of Fish and Wildlife personnel have developed proposed numbers of elk to be recommended as the level at which elk herds should be managed. Members of the livestock industry are

expressing concern that some of the management numbers being recommended by Department personnel are too high. The hunting community is supportive of more elk. An apparent polarization of the two positions is developing. The Oregon Fish and Wildlife Commission intends to establish a position on recommended elk herd management levels in July 1981.

Concern is being expressed, also, that scheduling of timber harvest at present or increased levels may, in some locations, reduce cover to a level which adversely affects elk production.

Planning Direction

Forest Plan alternatives will discuss the impacts of timber, range and wildlife habitat levels on each other and list mitigation measures that are contemplated. Various Forest Plan alternatives and effects can be aggregated on a Regional basis for the next cycle of planning, to further examine Regional aspects of this issue.

Timber Supply

Since the National Forests of the Pacific Northwest Region contain a majority of the Nation's inventory of softwood sawtimber, the role of the National Forests take on national importance in terms of timber supply. The Regional share of the 1980 RPA Program for timber sales offered reflects the national role in supplying timber for the nation. In addition to their national timber supply role, some National Forests will be directly affected by the Regional issue related to dwindling supplies from privately owned timber lands. For the next 20-30 years these local areas will face a growing dependence on National Forest timber supplies for existing manufacturing industries. In order to address this issue, the following is direction for development of Forest Plans within the Pacific Northwest Region:

Planning Direction

Forest Plans will consider departure from nondeclining evenflow timber harvest scheduling in at least two Forest Plan alternatives for the Forests west of the Cascade Range Crest and in at least one Forest Plan alternative for all other National Forests as shown above:

At Least Two Departure Alternatives

Gifford Pinchot NF
Mt. Baker-Snoqualmie NF
Mt. Hood NF
Olympic NF
Rogue River NF
Siskiyou NF
Siuslaw NF
Umpqua NF
Willamette NF

At least One Departure Alternative

Colville NF
Deschutes NF
Fremont NF
Malheur NF
Ochoco NF
Okanogan NF
Umatilla NF
Wallowa-Whitman NF
Wenatchee NF
Winema NF

Guidance on specific techniques, methodology and approaches for departure harvest scheduling in Forest Plans is provided in the Forest Service Manual, Chapter 1920.

Energy

The National Forests of the Pacific Northwest need to recognize the "Energy Issue" in preparing plans for future uses of National Forests. The issue could be stated as: "How should the National Forests of the Pacific Northwest Region be managed for production of energy?"

The issue of energy production from National Forests is in an emerging state at this time, with the worldwide search for future energy sources underway. There are several facets to this issue such as:

- a. How should National Forest wood fiber be planned for as a future energy source?
- b. How should National Forests plan for exploration and development of energy minerals such as coal, uranium, petroleum, and natural gas within the National Forests' boundaries.
- c. How should National Forests plan for development of hydroelectric facilities, including pumped storage sites?
- d. How should National Forests plan for potential site development for wind and solar energy production?
- e. How should National Forests plan for exploration and development of geothermal resources?
- f. How should National Forests plan for energy transmission facilities through the National Forests' boundaries?

Planning Direction

- a. Wood Fiber — Forest Plans will support the 1980 RPA National Program for research designed to develop knowledge about biomass for energy management, recognizing a possible role in future Forest Plans.

- b. Energy Minerals — Forest Plans will assess known potential for development of energy mineral resources, including coal, uranium, petroleum, and natural gas as specified in FSM 1922.36. Forest Plans will utilize the criteria in the Environmental Assessment for Oil and Gas Leasing Proposals, Pacific Northwest Region, April 1981.
- c. Hydroelectric — Forest Plans will assess known potential for development of hydroelectric facilities including pumped storage sites and transmission needs. Basic information on hydroelectric potential is listed in the Pacific Northwest River Basin report, "Water Today and Tomorrow," issued June 1979.
- d. Solar and Wind Generation Sites — Forest Plans will assess the known potential for development of sites for electrical generation facilities using wind or solar energy.
- e. Geothermal — Forest Plans will assess the known potential for exploration and development of geothermal resources, as provided in Forest Service Manual chapter 1922.36.
- f. Transmission Facilities — (See Standards and Guidelines for transportation and utility corridors.)

Old-Growth Timber

One of the Regional issues raised by public responses is the issue of old growth; or in reality, "How much, what kind and where should National Forest old-growth timber be maintained?" Generally, most people think of old growth as a plant community made up of very large trees and other related vegetation which has no visible evidence of man's alteration and may be several hundred years old. In the Pacific Northwest, many stands of timber on the National Forests are very old, and in the case of Douglas-fir trees, may be as large as 8 feet or more in diameter at eye-level and more than 200 feet in height. As more and more of the old-growth timber is harvested, there are concerns about maintaining some of it into the future. There are at least three main reasons cited for maintaining old growth: wildlife and plant habitat; ecosystem diversity; and preservation of aesthetics.

Old-growth timber stands are of ecological importance to society in that they represent a successional stage which provides unique habitats for certain species of wildlife. The northern spotted owl is an example of wildlife "indicator species" of old-growth habitat dependency known at the present time; however, other wildlife species are also known to rely heavily upon old

growth and reach their optimum population levels in old-growth habitats (pileated woodpecker, pine marten, 3-toed woodpecker).

People using the forest for recreational purposes enjoy old-growth trees for their aesthetic and awe-inspiring spiritual meanings. Old trees represent a living link to the past and provide an important visual link in the natural successional processes of the forest environment.

The issue of old growth is primarily focused on those lands currently dedicated to timber production (outside of dedicated wilderness and Research Natural Areas). There are a number of values associated with the retention of old growth; however, public concern appears to be concentrated on recreational use, wildlife habitat, maintenance of genetic diversity and preservation of old-growth ecosystems. Those opposed to the retention of old growth are primarily concerned with economic factors and urge rapid conversion of the existing old growth to managed forests of productive, young age classes.

The term "old growth" means different things to different people. Visual concerns may define it in terms of individual tree characteristics as crown shape, bark color, or size of the stem. To others it may imply the apparent lack of human intervention. Some may look for particular animals or plants inhabiting a unique kind of environment. Another sees the amount of wood available for harvest. A biologist might visualize the interplay between different forest and environmental components.

A definition of old growth becomes imperative in order to narrow our perspective onto a particular set of criteria and to view the issue through the same window. We cannot discuss old growth amongst ourselves and with others if old growth is not defined.

Several definitions have been developed over the last few years. Each definition reflects the interest and purpose of the party who developed it.

Following is a list of definition sources:

- a. Land Management Planning definition (R-6, 1920 memo 2/4/80).
- b. Old-growth issue paper definition (Old-Growth Issue, F.C. Hall, 3/3/80).
- c. Wildlife habitat definition for the Blue Mountains, (Thomas, J.W. [editor] et. al., 1979. Wildlife habitats in managed forests, the Blue Mountains of Oregon and Washington. Agric. Handbook 553. p. 483)
- d. A visual definition (Ron Walters, Landscape Architect, Regional Office 8/27/80).

- e. Timber Management Definition (Tom Ortman, John Hughes, and Bud Twombly, Regional Office, 3/27/80).
- f. Seven other definitions which represent biological, economic and environmental concerns, have been documented by Oregon Student Public Interest Research Group, (LaFollett, C. 1979. Saving all the pieces: old-growth forest in Oregon. OSPIRG report. p. 39-53).

Planning Direction

In order to address this issue, the following standard definition and direction statements are provided for the development of Forest Plans within the Pacific Northwest Region.

All National Forests will use the following standard definition for old growth:

An old-growth stand is defined as any stand of trees 10 acres or greater⁶ generally containing the following characteristics:

- Stands contain mature and overmature trees in the overstory and are well into the mature growth stage⁷.
- Stands will usually contain a multi-layered canopy and trees of several age classes.
- Standing dead trees and down material are present.
- Evidence of man's activities may be present but do not significantly alter the other characteristics and would be a subordinate factor in a description of such a stand.

This broad definition of old-growth is refined by identifying the *minimum* acceptable stand characteristics associated with the following six timber types found in the Pacific Northwest Region⁸

- a. Spruce-cedar-hemlock (K-1), cedar-hemlock-Douglas-fir (K-2), silver fir-Douglas-fir (F-3), mixed conifer-S.W. Oregon (K-5), red fir (K-7), California mixed evergreen (K-29):

At least 60 percent of overstory canopy level is dominated by Douglas-fir or some combination of intolerant species. The stand will contain some trees

with stem diameters 32 inches or greater, an average of two snags per acre will be present with another 30 tons of down logs per acre. Trees will have mature bark characteristics, for example, Douglas-fir will have deeply furrowed bark. Crown height growth will have slowed giving the tops a more rounded shape; tops may be broken. Limbs will usually be heavy and gnarled with mosses and lichens often present. Stands in these forest types will be considered old growth until there are less than five overmature trees per acre.

- b. Ponderosa shrub (K-10), western ponderosa (K-11), juniper woodland (K-24):

The stands will contain at least 10 mature to overmature trees per acre with ponderosa pine or juniper representing 75 percent of the overstory canopy level. Stem size will be at least 21 inches or greater in the overstory tree layer. Broken topped trees may be present. Ponderosa pine bark will be furrowed and platey with color ranging from orange to yellow. Overstory canopy closures will seldom exceed 50 percent on good sites or less than 20 percent on poor sites. A minimum of one standing snag per acre with at least 1.5 tons of down material including three logs per acre will be present.

- c. Lodgepole pine (SAF 218):

The stands will contain at least 12 trees per acre, 6 inches or larger in diameter. There will be an average of three snags with at least 3 tons of down material including three logs per acre. Lodgepole pine will represent at least 60 percent of overstory canopy level. Old-growth characteristics have a transitory nature in this timber type since lodgepole pine is a relatively short-lived species. Stands in excess of 80 years old (approximate culmination of mean annual increment) are subject to insect outbreaks, windfall and catastrophic fire. Individual trees have round to flat topped crowns, thin to irregular branching. Broken stems are common. These stands generally qualify as old growth.

- d. Alder-ash (K-25), Oregon oakwoods (K-26), quaking aspen (SAF-217).

Stands will contain at least 15 stems per acre, a minimum of one snag per acre and 1 ton of down material. Mosses and lichens are common in stands west of the Cascade Range.

- e. Douglas-fir (K-12), Cedar-hemlock-pine (K-13), grand fir-Douglas-fir (K-14), Western spruce-fir (K-15):

⁶ Optimum tract size will be related to the needs of dependent wildlife species such as northern spotted owls or pileated woodpeckers, and the ability to insulate part of the stand from the edge effects in created openings.

⁷ Definition of mature and overmature as per Handbook of Terminology, Society of American Foresters.

⁸ The specific forest component of each timber type is cross referenced to Kuchler (1964) using notation K.-

These stands include both intolerant and tolerant species. The stands will contain at least 15 trees per acre 21 inches or more in diameter, two snags with at least 3 tons of down material including three logs per acre. Broken topped trees may be present.

f. Fir-mountain hemlock (K-4):

The stands contain a diverse collection of subalpine forest types found in upper elevations of Pacific Northwest Region. The stands may be highly defective with at least five snags per acre and numerous broken topped trees present. Down logs should exceed 20 tons per acre. Stand will continue to be considered old growth until there are less than five dominant trees per acre.

Forest Plan Considerations:

- a. Forest Plan inventories for old growth will identify old growth where it occurs, regardless of other land classifications such as wilderness or productive forest land.
- b. Forest Plan alternatives shall address the old-growth issue by identifying levels of old growth for:
 - Wildlife Habitat
 - Ecosystem diversity
 - Old-growth preservation (aesthetics)
- c. Each Forest Plan alternative shall display the effects of implementing the alternative in terms of old-growth available for items listed in b above, with consideration of old-growth that serves more than one need.

80

10

1711
1712
1713

RPA Outputs, Activities and Costs

Table 17 displays the share of National RPA Program Outputs, activities and estimated costs allocated to the Pacific Northwest Region.

The Region RPA Targets are further refined by disaggregating them among the 19 National Forests in the Region. Tables 18-36 display the outputs, activities and costs for each National Forest in the Region.

These distributions were based on existing management plans and direction and other available information used to develop the RPA program and subsequent budget proposals. Regional issues and concerns were also considered in the distribution of targets to the forests.

Forest Plans will consider a wide range of alternatives and are not to be constrained by the RPA Program targets. One or more Forest Plan alternatives should, however, be formulated that meets or exceeds each RPA target assigned to the Forest by the Regional Plan. The emphasis in Forest Planning should be toward the future and how the inherent capabilities of the Forest can best be used to meet people's needs.

Some of the items listed on Tables 17 through 36 are program outputs, while others are either (1) program inputs, (2) intermediate outputs which serve as inputs to the production of other outputs, or (3) indicators of program effects. Decisions relative to Forest Plans will focus mainly on six major program outputs, including (1) developed recreation use, (2) dispersed recreation use, (3) wildlife habitat improvement, (4) anadromous fish improvement, (5) grazing use and (6) timber programmed sales offered.

Table 17 – Projected National Forest System Program Outputs, Activities, and Costs, Pacific Northwest Region

Program element and activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Million RVD	13.5	13.6	13.6	14.0	15.1	15.5	15.9	16.0	18.2
Dispersed Recreation Use (Includes Wildlife and Fish)	Million RVD	19.5	20.4	21.0	21.8	24.0	26.3	28.3	30.3	33.4
Trail Construction/Reconstruction	Miles	481	492	498	514	561	600	655	688	709
Wilderness										
Wilderness Management	Million acres	3.6	3.8	3.8	3.8	4.3	4.3	4.3	4.3	4.3
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	214	159	147	133	121	103	83	52	51
Anadromous Fish Improvement	Thousand pounds	0	10	39	1,090	1,050	2,160	2,880	2,880	2,880
Range										
Grazing Use (Livestock)	Million AUM	.732	.739	.746	.752	.755	.779	.813	.782	.880
Timber										
Programmed Sales Offered	Million board feet	5,217	5,281	5,340	5,455	5,455	5,590	5,590	5,640	5,640
Reforestation	Thousand acres	147	144	141	137	126	128	131	141	141
Timber Stand Improvement	Thousand acres	123	120	119	118	104	107	108	110	112
Water										
Meeting Water Quality Goals	Million acre feet	65.0	65.0	65.0	65.0	67.0	71.5	74.4	74.4	74.4
Minerals										
Minerals Leases and Permits	Operating plans	5,865	6,390	7,010	7,550	9,000	10,000	11,000	12,250	12,750
Human and Community Development										
Human Resources Programs¹	Enrollee years	1,915	1,915	1,915	1,915	139	139	139	139	139
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,941	1,880	1,805	1,700	1,514	1,514	1,515	1,525	1,553
Fuelbreaks and Fuel Treatment	Thousand acres	28.2	37.7	38.0	38.6	39.5	29.5	29.4	29.4	29.4
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	6.3	6.3	6.3	6.3	2.6	0.2	0.2	0.2	0.2
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	9.8	9.8	9.8	10.0	10.1	6.8	3.7	3.7	3.7
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	70	82	100	115	118	134	155	155	155
Returns to Government	Million dollars²									
Work Force	Thousand staff years									
Costs										
Operational	Million dollars	135.7	138.8	143.4	147.4	218.0	248.6	239.0	242.8	247.1
Capital Investments	Million dollars	361.9	367.1	372.0	384.7	310.5	319.3	327.5	332.5	339.2
Backlog	Million dollars	17.4	16.7	14.7	11.8	1.6	1.6	0	0	0
Total Appropriated³	Million dollars	497.6	505.9	515.4	532.1	528.5	567.9	566.5	575.3	586.3
Allocated Funds⁴	Million dollars	62.3	63.0	62.7	64.8	6.7	4.3	4.3	4.3	4.3
Total Region	Million dollars	559.9	568.9	578.1	596.9	535.2	572.2	570.8	579.6	590.6

¹ Human Resource Programs whose funds are allocated to the Forest Service are not included in figures beyond 1985.² All costs and returns are shown in constant 1978 dollars.³ NFS appropriated funds include all YCC and Cooperator Funds.⁴ NFS allocated costs include YACC and other human resource programs, O&C Grants, Land and Water Conservation, and other funds. Costs exclude payments to States and Counties, and Federal Highway Funds.

Abbreviations used: AUM = animal unit month; RVD = recreation visitor day.

Table 18 – Projected National Forest System Program Outputs, Activities, and Costs, Colville National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	283	283	283	287	300	300	300	300	300
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	489	509	522	535	580	620	660	680	730
Trail Construction/Reconstruction	Miles	0	0	0	0	1	3	7	9	10
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	9.654	7.173	6.632	6.000	5.459	4.647	3.744	2.346	2.300
Anadromous Fish Improvement	Thousand pounds	0	0	0	0	0	0	0	0	0
Range										
Grazing Use (Livestock)	Million AUM	0.035	0.036	0.036	0.037	0.037	0.040	0.040	0.038	0.040
Timber										
Programmed Sales Offered	Million board feet	103	107	113	119	125	181	191	225	225
Reforestation	Thousand acres	3.528	3.415	3.310	3.082	2.640	2.631	3.034	3.424	3.424
Timber Stand Improvement	Thousand acres	3.690	3.600	3.570	3.540	3.120	3.210	3.240	3.300	3.360
Water										
Meeting Water Quality Goals	Million acre feet	1.032	1.032	1.032	1.032	1.068	1.140	1.188	1.188	1.188
Minerals										
Minerals Leases and Permits	Operating plans	500	550	600	650	780	850	940	1,050	1,100
Human and Community Development										
Human Resources Programs	Enrollee years	197	197	197	197	14	14	14	14	14
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,464	1,511	1,574	1,671	1,876	1,876	1,875	1,863	1,830
Fuelbreaks and Fuel Treatment	Acres	854	854	854	854	854	854	854	854	854
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	0	0	0	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.300	0.300	0.300	0.300	0.300	0.200	0.100	0.100	0.100
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	1.4	1.6	2.4	3.3	3.4	4.6	5.7	5.7	5.7
Returns to Treasury	Million dollars	4.6	4.7	5.6	6.0	6.6	14.9	18.7	22.0	27.6
Costs										
Operational	Million dollars	4.3	4.5	4.8	5.3	7.7	11.0	11.9	14.8	14.9
Capital Investments	Million dollars	10.9	11.4	12.0	13.5	10.9	14.1	16.4	20.3	20.5
Backlog	Million dollars	.6	.5	.5	.4	.1	.1	0	0	0
Total Appropriated	Million dollars	15.8	16.4	17.3	19.2	18.7	25.2	28.3	35.1	35.4
Allocated Funds	Million dollars	2.0	2.0	2.2	2.3	.3	.2	.2	.3	.3
Total NFS	Million dollars	17.8	18.4	19.5	21.5	19.0	25.4	28.5	35.4	35.7

Table 19 – Projected National Forest System Program Outputs, Activities, and Costs, Deschutes National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	1,813	1,829	1,829	1,883	2,050	2,110	2,150	2,150	2,500
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	1,504	1,570	1,618	1,680	1,930	2,030	2,210	2,340	2,600
Trail Construction/Reconstruction	Miles	19	20	21	22	26	29	32	34	35
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	11.263	8.368	7.737	7.000	6.368	5.421	4.368	2.737	2.684
Anadromous Fish Improvement	Thousand pounds	0	0	0	0	0	0	0	0	0
Range										
Grazing Use (Livestock)	Million AUM	0.035	0.036	0.036	0.036	0.036	0.036	0.040	0.038	0.055
Timber										
Programmed Sales Offered	Million board feet	207	209	209	214	214	214	214	214	214
Reforestation	Thousand acres	8.411	8.370	8.285	8.143	7.975	8.101	8.100	8.224	8.224
Timber Stand Improvement	Thousand acres	8.610	8.400	8.330	8.260	7.280	7.490	7.560	7.700	7.840
Water										
Meeting Water Quality Goals	Million acre feet	0.688	0.688	0.688	0.688	0.712	0.760	0.792	0.792	0.792
Minerals										
Minerals Leases and Permits	Operating plans	1,250	1,360	1,485	1,585	1,900	2,130	2,320	2,360	2,400
Human and Community Development										
Human Resources Programs	Enrollee years	44	44	44	44	3	3	3	3	3
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,420	1,465	1,527	1,621	1,820	1,820	1,819	1,807	1,775
Fuelbreaks and Fuel Treatment	Acres	1,995	1,995	1,995	1,995	1,995	1,995	1,995	1,995	1,995
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	.100	.100	.100	.100	.050	.025	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.200	0.200	0.200	0.300	0.300	0.100	0.050	0.050	0.050
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	2.8	3.3	4.0	4.5	4.7	5.4	6.2	6.2	6.2
Returns to Treasury	Million dollars	21.1	21.1	21.1	21.5	22.0	22.0	23.0	25.0	27.6
Costs										
Operational	Million dollars	5.2	5.2	5.3	5.5	8.0	9.0	8.4	8.6	8.6
Capital Investments	Million dollars	13.0	13.1	13.4	14.1	11.4	11.5	11.6	11.8	11.8
Backlog	Million dollars	.7	.6	.5	.4	.1	.1	0	0	0
Total Appropriated	Million dollars	18.9	18.9	19.2	20.0	19.5	20.6	20.0	20.4	20.4
Allocated Funds	Million dollars	2.4	2.4	2.3	2.5	.2	.2	.2	.2	.2
Total NFS	Million dollars	21.3	21.3	21.5	22.5	19.7	20.8	20.2	20.6	20.6

Table 20 – Projected National Forest System Program Outputs, Activities, and Costs, Fremont National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	48	48	48	48	53	60	60	60	60
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	136	143	149	157	170	200	240	260	300
Trail Construction/Reconstruction	Miles	0	0	0	0	0	0	0	1	2
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	11.263	8.368	7.737	7.000	6.368	5.421	4.368	2.737	2.684
Anadromous Fish Improvement	Thousand pounds	0	0	0	0	0	0	0	0	0
Range										
Grazing Use (Livestock)	Million AUM	0.059	0.059	0.060	0.064	0.064	0.065	0.065	0.065	0.065
Timber										
Programmed Sales Offered	Million board feet	155	157	158	165	170	170	170	170	170
Reforestation	Thousand acres	6.722	6.590	6.310	6.000	6.000	6.230	6.330	7.000	7.000
Timber Stand Improvement	Thousand acres	6.150	6.000	5.950	5.900	5.200	5.350	5.400	5.500	5.600
Water										
Meeting Water Quality Goals	Million acre feet	0.430	0.430	0.430	0.430	0.445	0.475	0.495	0.495	0.495
Minerals										
Minerals Leases and Permits	Operating plans	125	135	145	160	190	200	200	200	200
Human and Community Development										
Human Resources Programs	Enrollee years	33	33	33	33	2	2	2	2	2
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,249	1,289	1,343	1,425	1,600	1,600	1,599	1,589	1,560
Fuelbreaks and Fuel Treatment	Acres	2,400	5,015	5,115	5,215	5,215	2,800	2,700	2,700	2,700
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	.100	0	0	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.800	0.800	0.800	0.800	0.900	0.700	0.500	0.500	0.500
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	2.1	2.4	3.7	4.4	4.6	5.2	5.6	5.6	5.6
Returns to Treasury	Million dollars	16.3	16.3	17.2	17.8	18.0	18.0	18.5	19.0	20.8
Costs										
Operational	Million dollars	4.2	4.2	4.3	4.5	6.9	7.6	7.2	7.3	7.5
Capital Investments	Million dollars	10.5	10.7	10.8	11.3	9.7	9.6	10.0	10.2	10.2
Backlog	Million dollars	.5	.5	.4	.4	.1	.1	0	0	0
Total Appropriated	Million dollars	15.2	15.4	15.5	16.2	16.7	17.3	17.2	17.5	17.7
Allocated Funds	Million dollars	1.9	1.9	1.9	2.0	.2	.2	.1	.1	.1
Total NFS	Million dollars	17.1	17.3	17.4	18.2	16.9	17.4	17.3	17.6	17.8

Table 21 – Projected National Forest System Program Outputs, Activities, and Costs, Gifford Pinchot National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	198	214	214	245	301	400	510	520	820
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	1,517	1,595	1,650	1,746	1,900	2,150	2,420	2,610	2,920
Trail Construction/Reconstruction	Miles	68	68	68	69	72	74	77	79	80
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	9.655	7.173	6.632	6.000	5.459	4.648	3.744	2.346	2.300
Anadromous Fish Improvement	Thousand pounds	0	0.400	1.560	43.600	42.000	86.400	115.200	115.200	115.200
Range										
Grazing Use (Livestock)	Million AUM	0.005	0.005	0.006	0.006	0.006	0.006	0.006	0.006	0.006
Timber										
Programmed Sales Offered	Million board feet	487	487	487	482	481	481	481	481	481
Reforestation	Thousand acres	14.394	14.250	14.060	13.797	12.650	12.630	12.900	13.500	13.500
Timber Stand Improvement	Thousand acres	6.150	6.000	5.950	5.900	5.200	5.350	5.400	5.519	5.600
Water										
Meeting Water Quality Goals	Million acre feet	7.740	7.740	7.740	7.740	8.010	8.550	8.910	8.910	8.910
Minerals										
Minerals Leases and Permits	Operating plans	250	275	300	325	390	430	490	570	650
Human and Community Development										
Human Resources Programs	Enrollee years	109	109	109	109	8	8	8	8	8
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,864	1,923	2,004	2,127	2,389	2,389	2,387	2,371	2,329
Fuelbreaks and Fuel Treatment	Acres	0	0	0	0	0	0	0	0	0
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	.050	0	0	.025	.025
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.500	0.500	0.500	0.500	0.500	0.300	0.150	0.150	0.150
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	6.3	7.0	8.0	8.5	8.7	9.4	10.0	10.0	10.0
Returns to Treasury	Million dollars	47.3	47.3	47.4	47.6	48.9	48.9	52.0	54.0	59.1
Costs										
Operational	Million dollars	9.7	9.8	10.0	9.8	14.4	16.3	15.1	15.6	15.6
Capital Investments	Million dollars	24.6	24.6	24.7	24.5	20.5	20.8	20.9	21.2	21.5
Backlog	Million dollars	1.2	1.2	1.0	.8	.1	.1	0	0	0
Total Appropriated	Million dollars	35.5	35.6	35.7	35.3	35.0	37.2	36.0	36.8	37.1
Allocated Funds	Million dollars	4.5	4.4	4.3	3.3	.5	.3	.3	.3	.3
Total NFS	Million dollars	40.0	40.0	40.0	39.5	35.5	37.5	36.3	37.1	37.4

Table 22 – Projected National Forest System Program Outputs, Activities, and Costs, Malheur National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	97	99	99	104	117	120	130	130	150
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	173	185	194	205	230	280	340	390	470
Trail Construction/Reconstruction	Miles	0	0	0	0	1	3	7	9	10
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	19.308	14.346	13.263	12.000	10.918	9.293	7.489	4.692	4.602
Anadromous Fish Improvement	Thousand pounds	0	0.700	2.730	76.300	73.500	151.200	201.600	201.600	201.600
Range										
Grazing Use (Livestock)	Million AUM	0.120	0.121	0.122	0.122	0.122	0.122	0.133	0.127	0.145
Timber										
Programmed Sales Offered	Million board feet	202	210	220	230	241	276	279	279	279
Reforestation	Thousand acres	4.004	3.989	3.860	3.705	3.100	3.000	3.120	3.200	3.200
Timber Stand Improvement	Thousand acres	4.920	4.800	4.760	4.720	4.160	4.280	4.320	4.400	4.480
Water										
Meeting Water Quality Goals	Million acre feet	1.290	1.290	1.290	1.290	1.335	1.425	1.485	1.485	1.485
Minerals										
Minerals Leases and Permits	Operating plans	50	60	70	80	90	100	110	140	150
Human and Community Development										
Human Resources Programs	Enrollee years	34	34	34	34	3	3	3	3	3
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,353	1,396	1,454	1,544	1,734	1,734	1,732	1,721	1,690
Fuelbreaks and Fuel Treatment	Acres	3,897	6,597	6,697	6,897	6,897	4,097	4,097	4,097	4,097
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	0	0	0	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	1.000	1.000	1.000	1.000	1.000	0.800	0.500	0.500	0.500
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	2.8	3.3	4.0	5.8	5.8	7.4	8.2	8.2	8.2
Returns to Treasury	Million dollars	16.1	16.6	17.4	18.0	19.0	23.0	26.0	30.0	34.2
Costs										
Operational	Million dollars	5.3	5.6	5.9	6.4	10.4	11.8	11.7	12.0	12.0
Capital Investments	Million dollars	13.6	14.0	14.8	16.4	14.7	15.1	16.1	16.4	16.4
Backlog	Million dollars	.7	.7	.6	.5	.1	.1	0	0	0
Total Appropriated	Million dollars	19.6	20.3	21.3	23.3	25.2	27.0	27.8	28.4	28.4
Allocated Funds	Million dollars	2.5	2.4	2.7	2.8	.3	.2	.2	.2	.3
Total NFS	Million dollars	22.1	22.9	24.0	26.1	25.5	27.2	28.0	28.6	28.7

Table 23 – Projected National Forest System Program Outputs, Activities, and Costs,
Mt. Baker-Snoqualmie National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	2,139	2,151	2,151	2,205	2,381	2,390	2,400	2,420	2,660
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	2,408	2,516	2,586	2,670	2,910	3,180	3,420	3,590	3,930
Trail Construction/Reconstruction	Miles	61	62	62	63	66	69	72	74	75
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	12.872	9.565	8.842	8.000	7.278	6.195	4.991	3.128	3.068
Anadromous Fish Improvement	Thousand pounds	0	1.000	3.900	109.000	105.000	216.000	288.000	288.000	288.000
Range										
Grazing Use (Livestock)	Million AUM	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Timber										
Programmed Sales Offered	Million board feet	288	296	301	314	322	338	338	343	343
Reforestation	Thousand acres	6.839	6.440	6.310	6.000	5.200	5.340	5.300	5.700	5.700
Timber Stand Improvement	Thousand acres	6.150	6.000	5.950	5.900	5.200	5.350	5.400	5.500	5.600
Water										
Meeting Water Quality Goals	Million acre feet	14.088	14.088	14.088	14.088	14.310	15.260	15.792	15.792	15.792
Minerals										
Minerals Leases and Permits	Operating plans	375	410	450	480	575	640	690	730	750
Human and Community Development										
Human Resources Programs	Enrollee years	178	178	178	178	13	13	13	13	13
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,379	1,422	1,482	1,573	1,767	1,767	1,765	1,754	1,723
Fuelbreaks and Fuel Treatment	Acres	534	534	534	534	534	534	534	534	534
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	.500	.025	.050	.050	.050
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.500	0.500	0.500	0.500	0.500	0.300	0.100	0.100	0.100
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	4.3	5.1	6.6	7.9	8.1	10.3	12.3	12.3	12.3
Returns to Treasury	Million dollars	27.2	27.6	27.7	28.0	28.7	30.7	33.0	37.0	42.1
Costs										
Operational	Million dollars	9.1	9.5	9.8	10.4	15.8	18.2	17.0	17.7	18.2
Capital Investments	Million dollars	23.4	24.0	24.5	26.4	22.5	23.3	23.4	24.2	24.9
Backlog	Million dollars	1.2	1.1	1.0	.8	.1	.1	0	0	0
Total Appropriated	Million dollars	33.5	34.6	35.3	37.6	38.4	41.6	40.4	41.9	43.1
Allocated Funds	Million dollars	4.3	4.3	4.3	4.6	.5	.3	.3	.3	.4
Total NFS	Million dollars	37.8	38.9	39.6	42.2	38.9	41.9	40.7	42.2	43.5

Table 24 – Projected National Forest System Program Outputs, Activities, and Costs, Mt. Hood National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	1,555	1,565	1,565	1,612	1,749	1,780	1,800	1,830	2,060
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	2,383	2,499	2,573	2,670	2,940	3,290	3,600	3,860	4,290
Trail Construction/Reconstruction	Miles	41	42	42	43	46	49	52	54	55
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	8.045	5.977	5.526	5.000	4.549	3.872	3.120	1.954	1.917
Anadromous Fish Improvement	Thousand pounds	0	1.000	3.900	109.000	105.000	216.000	288.000	288.000	288.000
Range										
Grazing Use (Livestock)	Million AUM	0.0178	0.0178	0.0178	0.0178	0.0178	0.0198	0.0198	0.0188	0.0198
Timber										
Programmed Sales Offered	Million board feet	422	418	418	418	376	376	376	376	376
Reforestation	Thousand acres	11.303	11.040	10.810	10.392	9.500	9.590	9.700	10.001	10.001
Timber Stand Improvement	Thousand acres	2.460	2.400	2.380	2.360	2.080	2.140	2.160	2.200	2.240
Water										
Meeting Water Quality Goals	Million acre feet	6.880	6.880	6.880	6.880	7.120	7.600	7.920	7.920	7.920
Minerals										
Minerals Leases and Permits	Operating plans	190	210	230	245	290	340	420	540	600
Human and Community Development										
Human Resources Programs	Enrollee years	278	278	278	278	20	20	20	20	20
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	2,676	2,761	2,877	3,054	3,430	3,430	3,427	3,405	3,344
Fuelbreaks and Fuel Treatment	Acres	737	1,237	1,237	1,237	1,237	837	837	837	837
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	.300	.025	.050	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.300	0.300	0.300	0.300	0.300	0.100	0.050	0.050	0.050
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	5.6	6.5	7.2	7.9	6.9	6.9	6.9	6.9	6.9
Returns to Treasury	Million dollars	29.8	29.4	29.5	30.0	31.8	33.3	36.0	42.0	46.2
Costs										
Operational	Million dollars	9.7	9.7	9.8	9.8	13.3	15.1	14.6	14.3	14.9
Capital Investments	Million dollars	24.6	24.3	24.5	24.7	18.9	19.4	19.7	19.6	20.4
Backlog	Million dollars	1.2	1.2	1.0	.8	.1	.1	0	0	0
Total Appropriated	Million dollars	35.5	35.2	35.3	35.3	32.3	34.6	34.3	33.9	35.3
Allocated Funds	Million dollars	4.5	4.4	4.3	4.3	.4	.3	.3	.3	.3
Total NFS	Million dollars	40.0	39.6	39.6	39.6	32.7	34.9	34.6	34.2	35.6

Table 25 — Projected National Forest System Program Outputs, Activities, and Costs, Ochocho National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	285	286	286	292	315	320	320	320	340
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	285	296	303	314	340	360	380	400	430
Trail Construction/Reconstruction	Miles	0	0	0	0	0	2	3	4	5
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	16.091	11.955	11.053	10.000	9.098	7.744	6.242	3.910	3.835
Anadromous Fish Improvement	Thousand pounds	0	0	0	0	0	0	0	0	0
Range										
Grazing Use (Livestock)	Million AUM	0.077	0.077	0.078	0.078	0.078	0.078	0.085	0.082	0.100
Timber										
Programmed Sales Offered	Million board feet	137	140	140	146	150	150	150	150	150
Reforestation	Thousand acres	1.361	1.290	1.260	1.050	1.060	1.120	1.310	1.400	1.400
Timber Stand Improvement	Thousand acres	4.920	4.800	4.760	4.720	4.160	4.280	4.320	4.400	4.480
Water										
Meeting Water Quality Goals	Million acre feet	0.258	0.258	0.258	0.258	0.267	0.285	0.297	0.297	0.297
Minerals										
Minerals Leases and Permits	Operating plans	380	400	440	480	575	650	660	660	660
Human and Community Development										
Human Resources Programs	Enrollee years	39	39	39	39	5	5	5	5	5
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,795	1,852	1,930	2,048	2,300	2,300	2,298	2,283	2,243
Fuelbreaks and Fuel Treatment	Acres	5,400	8,242	8,342	8,442	8,442	5,600	5,600	5,600	5,600
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	0	0	0	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.900	0.900	0.900	0.900	0.900	0.700	0.300	0.300	0.300
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	2.0	2.4	3.1	3.5	4.0	5.0	5.6	5.6	5.6
Returns to Treasury	Million dollars	16.2	16.5	16.6	17.0	17.3	17.3	17.5	18.0	18.5
Costs										
Operational	Million dollars	4.2	4.3	4.4	4.4	6.8	7.8	7.8	7.5	7.8
Capital Investments	Million dollars	10.8	10.7	11.0	11.1	9.5	10.0	10.6	10.3	10.7
Backlog	Million dollars	.5	.5	.5	.4	.1	.1	0	0	0
Total Appropriated	Million dollars	15.5	15.5	15.9	15.9	16.4	17.9	18.4	17.8	18.5
Allocated Funds	Million dollars	1.9	1.9	1.9	1.9	.2	.1	.1	.1	.1
Total NFS	Million dollars	17.4	17.4	17.8	17.8	16.6	18.0	18.5	17.9	18.6

Table 26 – Projected National Forest System Program Outputs, Activities, and Costs, Okanogan National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	353	353	353	359	360	360	360	360	360
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	562	580	592	607	640	660	660	660	670
Trail Construction/Reconstruction	Miles	57	58	59	61	65	67	70	73	75
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	12.872	9.565	8.842	8.000	7.278	6.195	4.992	3.128	3.068
Anadromous Fish Improvement	Thousand pounds	0	0.300	1.170	32.700	31.500	64.800	86.400	86.400	86.400
Range										
Grazing Use (Livestock)	Million AUM	0.054	0.055	0.055	0.056	0.056	0.058	0.060	0.057	0.060
Timber										
Programmed Sales Offered	Million board feet	82	83	86	94	104	104	104	104	104
Reforestation	Thousand acres	2.167	2.090	1.960	1.912	1.600	1.570	1.100	1.900	1.900
Timber Stand Improvement	Thousand acres	2.460	2.400	2.380	2.360	2.080	2.140	2.160	2.200	2.240
Water										
Meeting Water Quality Goals	Million acre feet	1.376	1.376	1.376	1.376	1.424	1.520	1.584	1.584	1.584
Minerals										
Minerals Leases and Permits	Operating plans	250	270	300	325	390	430	490	560	600
Human and Community Development										
Human Resources Programs	Enrollee years	52	52	52	52	4	4	4	4	4
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,013	1,045	1,089	1,156	1,298	1,298	1,297	1,288	1,265
Fuelbreaks and Fuel Treatment	Acres	1,200	1,367	1,367	1,567	1,567	1,200	1,200	1,200	1,200
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	.100	0	0	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.200	0.200	0.200	0.300	0.300	0.200	0.100	0.100	0.100
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	1.2	1.6	1.6	2.3	2.4	2.7	3.1	3.1	3.1
Returns to Treasury	Million dollars	4.7	4.7	4.8	5.2	6.9	8.0	9.5	11.9	12.7
Costs										
Operational	Million dollars	2.5	2.6	2.7	2.9	4.6	5.5	5.4	5.1	5.2
Capital Investments	Million dollars	6.4	6.5	6.7	7.5	6.4	7.0	7.5	7.1	7.2
Backlog	Million dollars	.3	.3	.3	.2	.1	.1	0	0	0
Total Appropriated	Million dollars	9.2	9.4	9.7	10.6	11.1	12.6	12.9	12.2	12.4
Allocated Funds	Million dollars	1.2	1.1	1.2	1.3	.1	.1	.1	.1	.1
Total NFS	Million dollars	10.4	10.5	10.9	11.9	11.2	12.7	13.0	12.3	12.5

Table 27 – Projected National Forest System Program Outputs, Activities, and Costs, Olympic National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	408	408	408	413	420	420	430	430	450
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	910	948	973	1,006	1,090	1,180	1,240	1,280	1,370
Trail Construction/Reconstruction	Miles	0	0	0	0	1	3	4	5	6
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	4.827	3.586	3.316	3.000	2.729	2.323	1.872	1.173	1.150
Anadromous Fish Improvement	Thousand pounds	0	0.900	3.510	98.100	94.500	194.400	259.200	259.200	259.200
Range										
Grazing Use (Livestock)	Million AUM	0	0	0	0	0	0	0	0	0
Timber										
Programmed Sales Offered	Million board feet	371	371	371	371	360	349	343	343	343
Reforestation	Thousand acres	12.184	11.999	11.960	11.800	11.105	11.300	12.030	13.000	13.000
Timber Stand Improvement	Thousand acres	6.150	6.000	5.950	5.900	5.200	5.350	5.400	5.500	5.600
Water										
Meeting Water Quality Goals	Million acre feet	5.160	5.160	5.160	5.160	5.340	5.700	5.940	5.940	5.940
Minerals										
Minerals Leases and Permits	Operating plans	100	110	120	130	160	170	200	240	250
Human and Community Development										
Human Resources Programs	Enrollee years	82	82	82	82	6	6	6	6	6
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	2,562	2,644	2,755	2,924	3,284	3,284	3,281	3,260	3,202
Fuelbreaks and Fuel Treatment	Acres	454	954	954	954	954	454	454	454	454
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	0	0	0	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.400	0.400	0.400	0.400	0.400	0.300	0.150	0.150	0.150
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	4.9	5.2	5.6	5.3	5.3	5.3	5.3	5.3	5.3
Returns to Treasury	Million dollars	20.5	20.3	20.4	21.0	22.4	25.0	30.0	30.0	30.0
Costs										
Operational	Million dollars	6.7	6.8	6.9	6.8	9.8	10.8	10.3	10.0	10.2
Capital Investments	Million dollars	17.0	17.0	17.1	17.4	13.8	13.7	14.0	13.8	13.9
Backlog	Million dollars	.9	.8	.7	.5	.1	.1	0	0	0
Total Appropriated	Million dollars	24.6	24.6	24.7	24.7	23.7	24.6	24.3	23.8	24.1
Allocated Funds	Million dollars	3.1	3.1	3.0	3.0	.4	.2	.2	.2	.2
Total NFS	Million dollars	27.7	27.7	27.7	27.7	24.7	24.8	24.5	24.0	24.3

Table 28 – Projected National Forest System Program Outputs, Activities, and Costs, Rogue River National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	466	467	467	478	516	520	520	520	570
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	436	454	466	482	520	560	600	620	670
Trail Construction/Reconstruction	Miles	6	7	8	10	14	17	21	23	25
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	6.436	4.782	4.421	4.000	3.639	3.098	2.496	1.564	1.534
Anadromous Fish Improvement	Thousand pounds	0	0.200	0.780	21.800	21.000	43.200	57.600	57.600	57.600
Range										
Grazing Use (Livestock)	Million AUM	0.022	0.022	0.022	0.022	0.022	0.024	0.024	0.023	0.024
Timber										
Programmed Sales Offered	Million board feet	216	216	216	216	206	206	198	198	198
Reforestation	Thousand acres	7.217	7.090	6.960	6.800	6.700	6.370	6.500	7.210	7.210
Timber Stand Improvement	Thousand acres	7.380	7.200	7.140	7.080	6.240	6.420	6.480	6.600	6.720
Water										
Meeting Water Quality Goals	Million acre feet	1.806	1.806	1.806	1.806	1.869	1.995	2.079	2.079	2.079
Minerals										
Minerals Leases and Permits	Operating plans	310	340	370	400	475	530	580	640	650
Human and Community Development										
Human Resources Programs	Enrollee years	44	44	44	44	3	3	3	3	3
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	2,700	2,786	2,903	3,081	3,460	3,460	3,457	3,435	3,373
Fuelbreaks and Fuel Treatment	Acres	651	751	751	751	751	651	651	651	651
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	.050	0	0	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.300	0.300	0.300	0.300	0.300	0.100	0.050	0.050	0.050
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	2.8	3.3	4.0	4.6	4.5	4.1	4.1	4.1	4.1
Returns to Treasury	Million dollars	24.4	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3
Costs										
Operational	Million dollars	6.3	6.3	6.4	6.4	9.2	10.2	9.8	9.3	9.1
Capital Investments	Million dollars	16.0	16.0	16.1	16.2	13.1	13.1	13.4	12.8	12.6
Backlog	Million dollars	.8	.8	.6	.5	.1	.1	0	0	0
Total Appropriated	Million dollars	23.1	23.1	23.1	23.1	22.4	23.4	23.2	22.1	21.7
Allocated Funds	Million dollars	2.9	2.9	2.9	2.9	.3	.2	.2	.3	.2
Total NFS	Million dollars	26.0	26.0	26.0	26.0	22.7	23.6	23.4	22.3	21.9

Table 29 – Projected National Forest System Program Outputs, Activities, and Costs, Siskiyou National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	116	116	116	118	120	120	120	120	120
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	599	625	642	664	720	780	830	900	940
Trail Construction/Reconstruction	Miles	3	4	5	7	11	13	17	19	20
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	8.045	5.977	5.526	5.000	4.549	3.872	3.120	1.954	1.917
Anadromous Fish Improvement	Thousand pounds	0	1.100	4.290	119.900	115.500	237.600	316.800	316.800	316.800
Range										
Grazing Use (Livestock)	Million AUM	0.009	0.009	0.009	0.009	0.009	0.010	0.010	0.010	0.010
Timber										
Programmed Sales Offered	Million board feet	203	203	203	203	200	200	200	200	200
Reforestation	Thousand acres	8.322	8.240	8.160	8.000	7.776	7.941	8.161	8.224	8.224
Timber Stand Improvement	Thousand acres	13.530	13.200	13.090	12.980	11.440	11.700	11.880	12.100	12.230
Water										
Meeting Water Quality Goals	Million acre feet	2.752	2.752	2.752	2.752	2.848	3.040	3.168	3.168	3.168
Minerals										
Minerals Leases and Permits	Operating plans	250	280	310	325	380	425	470	500	500
Human and Community Development										
Human Resources Programs	Enrollee years	44	44	44	44	3	3	3	3	3
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,979	2,042	2,127	2,258	2,536	2,536	2,534	2,517	2,472
Fuelbreaks and Fuel Treatment	Acres	150	250	250	250	250	150	150	150	150
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	.050	.050	.050	.050	0	0	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.500	0.500	0.500	0.500	0.500	0.300	0.100	0.100	0.100
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	2.8	3.3	4.0	4.3	3.5	3.2	3.2	3.2	3.2
Returns to Treasury	Million dollars	27.5	27.4	26.0	25.5	25.0	25.0	25.0	25.0	24.6
Costs										
Operational	Million dollars	7.1	7.2	7.3	7.3	10.6	11.8	11.2	11.5	11.3
Capital Investments	Million dollars	18.3	18.2	18.3	18.4	15.1	15.1	15.4	15.7	15.4
Backlog	Million dollars	.9	.9	.7	.6	.1	.1	0	0	0
Total Appropriated	Million dollars	26.3	26.3	26.3	26.3	25.8	27.0	26.6	27.2	26.7
Allocated Funds	Million dollars	3.3	3.3	3.3	3.3	.4	.2	.2	.2	.2
Total NFS	Million dollars	29.6	29.6	29.6	29.6	26.2	27.2	26.8	27.4	26.9

Table 30 — Projected National Forest System Program Outputs, Activities, and Costs, Siuslaw National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	960	960	960	974	1,000	1,000	1,000	1,000	1,000
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	706	731	746	767	820	850	870	880	890
Trail Construction/Reconstruction	Miles	0	0	0	0	0	0	0	0	1
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	6.436	4.782	4.421	4.000	3.639	3.098	2.496	1.564	1.534
Anadromous Fish Improvement	Thousand pounds	0	1.400	5.460	152.600	147.000	302.400	403.200	403.200	403.200
Range										
Grazing Use (Livestock)	Million AUM	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Timber										
Programmed Sales Offered	Million board feet	406	415	424	437	440	444	444	446	446
Reforestation	Thousand acres	9.839	9.540	9.305	9.150	8.550	8.800	9.100	9.840	9.840
Timber Stand Improvement	Thousand acres	15.990	15.600	15.470	15.340	13.520	13.910	14.040	14.300	14.560
Water										
Meeting Water Quality Goals	Million acre feet	3.010	3.010	3.010	3.010	3.115	3.325	3.465	3.465	3.465
Minerals										
Minerals Leases and Permits	Operating plans	560	610	660	720	860	950	1,080	1,270	1,300
Human and Community Development										
Human Resources Programs	Enrollee years	195	195	195	195	14	14	14	14	14
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	2,936	3,029	3,156	3,350	3,762	3,762	3,759	3,735	3,668
Fuelbreaks and Fuel Treatment	Acres	0	0	0	0	0	0	0	0	0
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	.100	.100	.100	.500	.100	.075	.050	.050
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.300	0.300	0.300	0.300	0.300	0.100	0.050	0.050	0.050
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	5.4	7.0	8.6	10.0	10.4	11.7	13.4	13.4	13.4
Returns to Treasury	Million dollars	50.7	51.7	51.9	52.0	52.3	52.3	53.0	53.5	54.8
Costs										
Operational	Million dollars	8.6	9.0	9.3	9.9	14.3	16.2	15.7	15.6	15.7
Capital Investments	Million dollars	22.4	22.7	23.3	24.9	20.3	20.6	21.4	21.3	21.5
Backlog	Million dollars	1.1	1.1	1.0	.8	.1	.1	0	0	0
Total Appropriated	Million dollars	32.1	32.8	33.6	35.6	34.7	36.9	37.1	36.9	37.2
Allocated Funds	Million dollars	4.0	4.1	4.1	4.3	.4	.4	.3	.3	.3
Total NFS	Million dollars	36.1	36.9	37.7	39.9	35.1	37.2	37.4	37.2	37.5

Table 31 — Projected National Forest System Program Outputs, Activities, and Costs, Umatilla National Forest

		Annual Units								
Output/Activity	Unit of Measure	1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	259	259	259	260	260	260	260	260	260
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	1,293	1,348	1,384	1,431	1,670	1,690	1,790	1,850	2,020
Trail Construction/Reconstruction	Miles	21	22	23	25	29	32	37	39	40
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	16.091	11.955	11.053	10.000	9.098	7.744	6.241	3.910	3.835
Anadromous Fish Improvement	Thousand pounds	0	0.700	2.730	76.300	73.500	151.200	201.600	201.600	201.600
Range										
Grazing Use (Livestock)	Million AUM	0.059	0.059	0.060	0.060	0.062	0.064	0.065	0.063	0.065
Timber										
Programmed Sales Offered	Million board feet	179	183	185	200	205	205	205	205	205
Reforestation	Thousand acres	5.505	5.445	5.430	5.359	4.715	5.040	5.300	5.900	5.900
Timber Stand Improvement	Thousand acres	1.230	1.200	1.190	1.180	1.040	1.070	1.080	1.091	1.120
Water										
Meeting Water Quality Goals	Million acre feet	1.290	1.290	1.290	1.290	1.335	1.425	1.485	1.485	1.485
Minerals										
Minerals Leases and Permits	Operating plans	250	270	300	320	380	400	400	400	400
Human and Community Development										
Human Resources Programs	Enrollee years	32	32	32	32	2	2	2	2	2
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,419	1,464	1,525	1,619	1,818	1,818	1,816	1,805	1,773
Fuelbreaks and Fuel Treatment	Acres	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	0	0	0	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.500	0.500	0.500	0.500	0.500	0.400	0.200	0.200	0.200
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	2.1	2.4	3.5	3.5	3.5	4.2	5.7	5.7	5.7
Returns to Treasury	Million dollars	10.8	10.9	11.0	11.0	11.0	14.0	19.0	22.7	25.2
Costs										
Operational	Million dollars	3.9	4.1	4.1	4.4	6.7	7.7	7.6	7.3	7.6
Capital Investments	Million dollars	10.0	10.3	10.4	11.4	9.5	9.7	10.4	10.0	25.6
Backlog	Million dollars	.5	.5	.4	.4	.1	.1	0	0	0
Total Appropriated	Million dollars	14.4	14.9	14.9	16.2	16.3	17.5	18.0	17.3	18.0
Allocated Funds	Million dollars	1.9	1.8	1.9	2.0	.2	.1	.1	.1	.1
Total NFS	Million dollars	16.3	16.7	16.8	18.2	16.5	17.6	18.1	17.4	18.1

Table 32 – Projected National Forest System Program Outputs, Activities, and Costs, Umpqua National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	817	842	842	901	1,026	1,170	1,330	1,340	1,860
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	392	421	442	470	540	670	810	930	1,090
Trail Construction/Reconstruction	Miles	4	5	6	7	11	13	17	19	20
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	6.436	4.782	4.421	4.000	3.639	3.098	2.496	1.564	1.534
Anadromous Fish Improvement	Thousand pounds	0	0.800	3.120	87.200	84.000	172.800	230.400	230.400	230.400
Range										
Grazing Use (Livestock)	Million AUM	0.022	0.022	0.022	0.022	0.022	0.024	0.024	0.023	0.024
Timber										
Programmed Sales Offered	Million board feet	393	406	415	423	427	427	427	436	436
Reforestation	Thousand acres	10.561	10.340	10.200	9.924	9.270	8.800	9.110	9.820	9.820
Timber Stand Improvement	Thousand acres	8.610	8.400	8.330	8.260	7.280	7.490	7.560	7.700	7.840
Water										
Meeting Water Quality Goals	Million acre feet	2.752	2.752	2.752	2.752	2.848	3.040	3.168	3.168	3.168
Minerals										
Minerals Leases and Permits	Operating plans	150	165	180	190	230	255	280	310	320
Human and Community Development										
Human Resources Programs	Enrollee years	211	211	211	211	15	15	15	15	15
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	2,158	2,226	2,319	2,462	2,765	2,765	2,762	2,745	2,696
Fuelbreaks and Fuel Treatment	Acres	353	453	453	453	453	453	453	453	453
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	0	0	0	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.300	0.300	0.300	0.300	0.300	0.100	0.050	0.050	0.050
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	5.3	6.3	8.0	9.8	10.0	12.2	15.4	15.4	15.4
Returns to Treasury	Million dollars	45.1	46.5	46.5	46.5	47.0	51.0	52.0	52.5	53.5
Costs										
Operational	Million dollars	8.3	8.6	9.0	9.3	13.6	15.3	14.7	14.9	15.0
Capital Investments	Million dollars	21.1	21.8	22.3	23.7	19.1	19.5	20.2	20.5	20.7
Backlog	Million dollars	1.0	1.0	.9	.7	.1	.1	0	0	0
Total Appropriated	Million dollars	30.4	31.4	32.2	33.7	32.8	34.9	34.9	35.4	35.7
Allocated Funds	Million dollars	3.8	3.9	3.9	4.1	.4	.3	.3	.2	.3
Total NFS	Million dollars	34.2	35.3	36.1	37.8	33.2	35.2	35.2	35.2	36.0

**Table 33 — Projected National Forest System Program Outputs, Activities, and Costs,
Wallowa-Whitman National Forest**

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	370	370	370	378	407	410	410	410	430
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	1,002	1,042	1,066	1,101	1,180	1,260	1,310	1,350	1,450
Trail Construction/Reconstruction	Miles	64	65	65	66	70	73	77	79	80
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	19.308	14.346	13.263	12.000	10.917	9.293	7.489	4.692	4.602
Anadromous Fish Improvement	Thousand pounds	0	0.500	1.950	54.500	52.500	108.000	144.000	144.000	144.000
Range										
Grazing Use (Livestock)	Million AUM	0.162	0.164	0.165	0.165	0.166	0.173	0.180	0.173	0.195
Timber										
Programmed Sales Offered	Million board feet	214	215	217	220	220	220	220	220	220
Reforestation	Thousand acres	4.872	4.640	4.360	4.050	3.200	3.670	3.700	4.500	4.500
Timber Stand Improvement	Thousand acres	4.920	4.800	4.760	4.720	4.160	4.280	4.320	4.400	4.480
Water										
Meeting Water Quality Goals	Million acre feet	2.580	2.580	2.580	2.580	2.670	2.850	2.970	2.970	2.970
Minerals										
Minerals Leases and Permits	Operating plans	250	270	300	320	380	425	470	500	500
Human and Community Development										
Human Resources Programs	Enrollee years	55	55	55	55	4	4	4	4	4
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,040	1,073	1,019	1,081	1,214	1,214	1,213	1,205	1,184
Fuelbreaks and Fuel Treatment	Acres	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	3.000	.400	0	0	.050	.050
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	1.000	1.000	1.000	1.000	1.000	0.900	0.600	0.600	0.600
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	2.8	3.3	4.0	4.6	4.7	5.4	7.2	7.2	7.2
Returns to Treasury	Million dollars	8.1	8.0	9.0	9.0	10.0	13.0	18.0	24.0	27.1
Costs										
Operational	Million dollars	6.6	6.7	6.8	6.9	10.2	11.4	10.8	10.9	11.2
Capital Investments	Million dollars	16.8	16.8	17.1	17.5	14.4	14.6	15.0	14.9	15.4
Backlog	Million dollars	.8	.8	.7	.6	.1	.1	0	0	0
Total Appropriated	Million dollars	24.2	24.3	24.6	25.0	24.7	26.1	25.8	25.8	26.6
Allocated Funds	Million dollars	3.0	3.0	3.0	3.0	.4	.2	.2	.2	.2
Total NFS	Million dollars	27.2	27.3	27.6	28.0	25.1	26.3	26.0	26.0	26.8

Table 34 – Projected National Forest System Program Outputs, Activities, and Costs, Wenatchee National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	1,437	1,445	1,445	1,490	1,616	1,640	1,670	1,690	1,910
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	3,009	3,137	3,274	3,410	3,780	4,310	4,530	5,200	5,890
Trail Construction/Reconstruction	Miles	91	92	92	93	96	98	101	103	104
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	14.481	10.759	9.947	9.000	8.188	6.970	5.618	3.519	3.451
Anadromous Fish Improvement	Thousand pounds	0	0.600	2.340	65.400	63.000	129.600	172.800	172.800	172.800
Range										
Grazing Use (Livestock)	Million AUM	0.027	0.028	0.028	0.028	0.028	0.028	0.030	0.029	0.035
Timber										
Programmed Sales Offered	Million board feet	196	198	200	210	210	210	210	210	210
Reforestation	Thousand acres	6.378	6.090	5.800	5.427	4.780	5.340	5.300	5.720	5.720
Timber Stand Improvement	Thousand acres	2.460	2.400	2.380	2.360	2.080	2.140	2.160	2.200	2.240
Water										
Meeting Water Quality Goals	Million acre feet	3.870	3.870	3.870	3.870	4.005	4.275	4.455	4.455	4.455
Minerals										
Minerals Leases and Permits	Operating plans	200	220	240	260	300	340	400	600	670
Human and Community Development										
Human Resources Programs	Enrollee years	103	103	103	103	7	7	7	7	7
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,346	1,389	1,447	1,536	1,725	1,725	1,723	1,712	1,682
Fuelbreaks and Fuel Treatment	Acres	900	900	900	900	1,600	1,000	1,000	1,000	1,000
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	6.300	6.050	6.050	3.050	.300	0	0	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.600	0.600	0.600	0.600	0.600	0.500	0.300	0.300	0.300
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	2.8	3.2	3.7	4.4	4.5	5.4	7.2	7.2	7.2
Returns to Treasury	Million dollars	6.6	6.6	7.0	7.0	8.0	12.0	17.0	23.0	25.7
Costs										
Operational	Million dollars	5.1	5.2	5.3	5.6	8.3	9.3	9.1	8.7	9.1
Capital Investments	Million dollars	13.0	13.1	13.4	14.1	11.6	11.9	12.5	12.3	12.5
Backlog	Million dollars	.7	.6	.5	.4	.1	.1	0	0	0
Total Appropriated	Million dollars	18.8	18.9	19.2	20.1	20.0	21.3	21.6	21.0	21.6
Allocated Funds	Million dollars	2.3	2.4	2.3	2.5	.2	.2	.2	.2	.2
Total NFS	Million dollars	21.1	21.3	21.5	22.6	20.2	21.5	21.8	21.2	21.8

Table 35 – Projected National Forest System Program Outputs, Activities, and Costs, Willamette National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	1,412	1,420	1,420	1,457	1,575	1,580	1,590	1,600	1,780
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	1,431	1,496	1,538	1,595	1,730	1,900	2,050	2,150	2,370
Trail Construction/Reconstruction	Miles	46	47	47	48	51	54	57	59	60
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	14.481	10.759	9.947	9.000	8.188	6.970	5.618	3.518	3.451
Anadromous Fish Improvement	Thousand pounds	0	0.400	1.560	43.600	42.000	86.400	115.200	115.200	115.200
Range										
Grazing Use (Livestock)	Million AUM	0.005	0.005	0.006	0.006	0.006	0.006	0.006	0.006	0.006
Timber										
Programmed Sales Offered	Million board feet	792	802	812	823	834	869	870	870	870
Reforestation	Thousand acres	17.154	16.990	16.800	16.675	15.729	15.200	15.500	16.920	16.920
Timber Stand Improvement	Thousand acres	11.070	10.800	10.710	10.620	9.360	9.630	9.720	9.900	10.080
Water										
Meeting Water Quality Goals	Million acre feet	7.740	7.740	7.740	7.740	8.012	8.550	8.910	8.910	8.910
Minerals										
Minerals Leases and Permits	Operating plans	375	400	450	485	575	650	710	850	900
Human and Community Development										
Human Resources Programs	Enrollee years	115	115	115	115	8	8	8	8	8
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,553	1,602	1,670	1,772	1,990	1,990	1,988	1,976	1,940
Fuelbreaks and Fuel Treatment	Acres	1,635	1,635	1,635	1,635	1,735	1,635	1,635	1,635	1,635
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	.050	0	0	0	0
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.800	0.800	0.800	0.800	0.800	0.500	0.250	0.250	0.250
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	10.5	12.3	15.0	17.7	19.5	21.6	25.3	25.3	25.3
Returns to Treasury	Million dollars	100.3	101.6	101.9	102.0	102.3	108.3	110.0	114.0	119.1
Costs										
Operational	Million dollars	15.1	15.4	15.9	16.3	25.0	28.5	27.2	27.8	28.5
Capital Investments	Million dollars	40.5	38.7	39.6	41.1	36.9	36.4	37.4	38.0	39.2
Backlog	Million dollars	1.9	2.1	1.6	1.3	.1	.1	0	0	0
Total Appropriated	Million dollars	55.5	56.2	57.1	58.7	62.0	65.0	64.6	65.8	67.7
Allocated Funds	Million dollars	7.0	7.0	6.9	7.2	.8	.5	.5	.5	.5
Total NFS	Million dollars	62.5	63.2	64.0	65.9	62.8	65.5	65.1	66.3	68.2

Table 36 – Projected National Forest System Program Outputs, Activities, and Costs, Winema National Forest

Output/Activity	Unit of Measure	Annual Units								
		1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Recreation										
Developed Recreation Use (Includes VIS)	Thousand RVD	484	485	485	496	534	540	540	540	570
Dispersed Recreation Use (Includes Wildlife and Fish)	Thousand RVD	265	275	282	290	310	330	340	350	370
Trail Construction/Reconstruction	Miles	0	0	0	0	1	3	4	5	6
Wildlife and Fish										
Wildlife Habitat Improvement	Thousand acre equivalents	6.436	4.782	4.421	4.000	3.639	3.098	2.496	1.564	1.534
Anadromous Fish Improvement	Thousand pounds	0	0	0	0	0	0	0	0	0
Range										
Grazing Use (Livestock)	Million AUM	0.018	0.018	0.018	0.018	0.018	0.020	0.020	0.018	0.025
Timber										
Programmed Sales Offered	Million board feet	164	165	165	170	170	170	170	170	170
Reforestation	Thousand acres	6.233	6.152	5.860	5.734	4.950	5.320	5.405	5.720	5.720
Timber Stand Improvement	Thousand acres	6.150	6.000	5.950	5.900	5.200	5.350	5.400	5.500	5.600
Water										
Meeting Water Quality Goals	Million acre feet	0.258	0.258	0.258	0.258	0.267	0.285	0.297	0.297	0.297
Minerals										
Minerals Leases and Permits	Operating plans	50	55	60	70	80	85	90	130	150
Human and Community Development										
Human Resources Programs	Enrollee years	45	45	45	45	3	3	3	3	3
Protection										
Fire Management Effectiveness Index	Dollars/ thousand acres	1,654	1,707	1,778	1,887	2,120	2,120	2,118	2,104	2,067
Fuelbreaks and Fuel Treatment	Acres	1,917	1,917	1,917	1,917	2,017	1,917	1,917	1,917	1,917
Lands										
Land Purchase and Acquisition (Excludes Exchange)	Thousand acres	0	0	0	0	.100	0	0	.025	.025
Soils										
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand acres	0.400	0.400	0.400	0.400	0.400	0.200	0.100	0.100	0.100
Facilities										
Road Construction/Reconstruction (Arterial, Collector)	Miles	2.1	2.4	3.0	3.4	3.5	4.0	4.6	4.6	4.6
Returns to Treasury	Million dollars	18.0	18.0	18.4	18.5	19.0	19.0	19.5	19.5	20.9
Costs										
Operational	Million dollars	3.2	3.3	3.3	3.4	5.0	5.9	5.7	5.7	5.7
Capital Investments	Million dollars	8.3	8.3	8.4	8.6	7.1	7.4	7.9	7.9	7.9
Backlog	Million dollars	.4	.4	.3	.3	.1	.1	0	0	0
Total Appropriated	Million dollars	11.9	12.0	12.0	12.3	12.2	13.4	13.6	13.6	13.6
Allocated Funds	Million dollars	1.5	1.5	1.5	1.5	.2	.1	.1	.1	.1
Total NFS	Million dollars	13.4	13.5	13.5	13.8	12.4	13.5	13.7	13.7	13.7

1. The first part of the document is a list of names and addresses of the members of the committee.

2. The second part of the document is a list of the names and addresses of the members of the committee.

3. The third part of the document is a list of the names and addresses of the members of the committee.

4. The fourth part of the document is a list of the names and addresses of the members of the committee.

5. The fifth part of the document is a list of the names and addresses of the members of the committee.

6. The sixth part of the document is a list of the names and addresses of the members of the committee.

7. The seventh part of the document is a list of the names and addresses of the members of the committee.

8. The eighth part of the document is a list of the names and addresses of the members of the committee.

9. The ninth part of the document is a list of the names and addresses of the members of the committee.

10. The tenth part of the document is a list of the names and addresses of the members of the committee.

11. The eleventh part of the document is a list of the names and addresses of the members of the committee.

12. The twelfth part of the document is a list of the names and addresses of the members of the committee.

13. The thirteenth part of the document is a list of the names and addresses of the members of the committee.

14. The fourteenth part of the document is a list of the names and addresses of the members of the committee.

15. The fifteenth part of the document is a list of the names and addresses of the members of the committee.

16. The sixteenth part of the document is a list of the names and addresses of the members of the committee.

17. The seventeenth part of the document is a list of the names and addresses of the members of the committee.

18. The eighteenth part of the document is a list of the names and addresses of the members of the committee.

Management Standards and Guidelines

Introduction

The National Forest Management Act requires the establishment and evaluation of standards and guidelines for seven resource management practices. Standards for the management of the northern spotted owl are also included pursuant to the Chief's August 11, 1980, decision on an administrative appeal filed by the Oregon Wilderness Coalition, et. al.

The standards and guidelines are summarized as follows:

- a. Silvicultural systems.
- b. Size and dispersal of openings and state of vegetation.
- c. Biological growth potential.
- d. Management intensity and utilization standards.
- e. Unit of measure (mean annual increment).
- f. Air quality.
- g. Utility and transportation corridors.
- h. Northern spotted owl habitat management.

Proposed Standards and Guidelines

The silvicultural standards and guidelines developed by this statement apply to commercial forest land in the National Forest system of the Pacific Northwest Region except in the Shelton Cooperative Sustained Yield Unit. For the Shelton Unit, the Olympic National Forest will examine these standards and guidelines for consistency with the Cooperative Unit Agreement. Those Regional standards and guidelines which are found to be consistent will apply. Where inconsistencies exist, specific standards and guidelines addressing those inconsistencies may be established during Forest planning.

Silvicultural Systems

Standard 1-1. The even-aged silvicultural system will be the most commonly used system in coniferous forests of the Pacific Northwest Region. The uneven-aged silvicultural system may be used when healthy, fully stocked, uneven-aged stands exist or can be created by identified treatments within a defined time period. The selection of the appropriate silvicultural system will be guided by criteria (a) through (f) and the current land allocation. See appendix G for discussion.

- a. The selected silvicultural system must permit the production of sufficient volume of marketable trees to permit utilization of all trees which meet utilization standards and are designated for harvest.

- b. The selected silvicultural system must permit the use of an available and acceptable logging method that has the capability to remove logs and other products without excessive damage to the identified desirable residual vegetation.
- c. The selected silvicultural system must be capable of providing special conditions such as a continuous canopy or continuous high density live root mats when required by critical soil conditions or needed to achieve management objectives such as streamside protection, wildlife needs, and visual resources.
- d. The selected silvicultural system must permit control of existing or potential vegetation to a degree that establishment of numbers of trees, other desirable vegetation, and rates of growth as identified in site specific silvicultural prescriptions for harvest areas can be achieved.
- e. The silvicultural system selected must promote stand structure and species composition which avoids serious risk of damage from mammals, insects, disease, or wildfire and will allow treatment of existing insect, disease, or fuel conditions.
- f. The silvicultural system selected must meet resource allocation and vegetation management objectives identified in Regional and Forest Plans. Silvicultural systems for specific areas may be identified in Forest Plans, environmental assessments, or in silvicultural prescriptions written or reviewed by a certified silviculturist except where provided for otherwise by legislation or regulation.

Size and Dispersal of Openings and State of Vegetation

Standard 2-1. Forest openings created by the application of even-aged silviculture shall be limited to a maximum size of 60 acres in the Douglas-fir type of the coastal Douglas-fir zone and to a maximum size of 40 acres on all other National Forest lands in the Pacific Northwest Region. Exceptions are permitted in the following cases: (1) when natural catastrophic situations such as fires, windstorms, or insect and disease attacks occur; (2) on an individual case basis after 60 day public notice and review by the Regional Forester; or (3) when any one of the criteria described below is met and will produce a more desirable combination of benefits, the limits may be exceeded by not more than 50 percent without review by the Regional Forester or 60 day public notice.

Criteria for 50 Percent Exception

- a. When larger created openings will reduce the disturbance to soil, water, fish, or riparian resources, and residual vegetation by: (1) allowing economically feasible logging systems that reduce landing and road construction; or (2) locating roads away from unstable soils; and (3) by reducing soil and vegetation disturbance from dragging logs.
- b. Where groups of dwarf mistletoe or root rot disease infected trees need to be incorporated into the created opening to avoid infection of susceptible conifer reproduction and their inclusion cannot be achieved by centering the created opening over the area of infection.
- c. Where visual quality objectives require shaping and blending of openings to fit landform.
- d. Where larger units are needed to achieve silviculture objectives in existing areas of regeneration cutting by the shelterwood method and where destruction of the newly created stand of reproduction would occur as a result of delayed removal of shelter trees. This exception applies only to existing shelterwood units and shelterwood units under contract prior to approval of the Forest Plan.

Standard 2-2. Created openings will be separated by areas generally not classed as created openings. The areas between created openings shall contain one or more logical harvest units. These areas shall be large enough and contain a stand structure to meet resource requirements of the Forest Plan. Resource requirements may include wildlife habitat, watershed, landscape management and others.

Guideline a. The total area of created openings contiguous to 30 acre or larger natural openings should normally be limited to an area not exceeding $\frac{1}{3}$ the size of the natural opening and not occupying more than $\frac{1}{3}$ of the natural opening perimeter. Openings should not be created adjacent to any natural openings unless adequate vegetation along the edge can be developed or retained in sufficient density to protect wildlife values and visual management objectives. The determination of adequate vegetation will be made by an appropriate interdisciplinary team.

Standard 2-3. A harvested area of commercial forest will no longer be considered a created opening for silvicultural purposes when stocking surveys carried out in accordance with Regional instructions indicate prescribed crop tree stocking at or above $4\frac{1}{2}$ feet in height and free to grow. Where other resource management considerations are limiting, such as

wildlife habitat and visual requirements, a created opening will no longer be considered an opening when the vegetation in it meets the management prescription objective.

Biological Growth Potential

Standard 3-1. The minimum biological growth potential level for classifying land as being capable of timber production is 20 cubic feet of wood fiber per acre per year for all species.

Management Intensity and Utilization Standards

Standard 4-1. The Management intensity to be used in determining harvest levels for the Region will vary with site productivity, timber species, other resource management objectives, and projection of time. Each of the following timber management practices are eligible and may be used singly or in combination in determining the appropriate management intensity.

- a. Site preparation — chemical, mechanical and prescribed fire.
- b. Tree improvement (genetics).
- c. Reforestation by planting, seeding, or natural.
- d. Growing stock protection from animals, insects, and diseases.
- e. Release and weeding — chemical, mechanical, and prescribed fire.
- f. Precommercial thinning.
- g. Fertilization.
- h. Commercial thinning.
- i. Salvage.
- j. Final harvest.

Standard 4-2. The utilization standards to be used in determining harvest levels shall be separated into first decade and future decades. The following standards shall apply on all Forests except where individual market areas and/or specific products present opportunities for standards utilizing a higher proportion of the tree, in which case, the planning in these Forests will not be limited to the stated Regional standards.

Species (groups)	Min DBH ¹	Min Top DIB ²
<i>First decade</i>		
Existing mature except lodgepole pine	9"	6"
Existing commercial thinning size and lodgepole pine	7"	4"
<i>Future decades</i>		
All species	7"	4"

¹DBH — Diameter at Breast Height

²DIB — Diameter Inside Bark

Unit of Measure

Standard 5-1. The unit of measure for expressing mean annual increment will be the cubic foot.

Air Quality

Standard 6-1. The Forest Service will comply with applicable air quality laws and regulations.

Standard 6-2. Wildfire will be suppressed as rapidly and efficiently as possible.

Standard 6-3. In obtaining total resource objectives in forest management, the role and potential of fire as an integral part of the forest and rangeland environment will be considered.

Guideline a. Prescribed burning will be considered for use to meet management objectives in areas where ecological studies show that fire has played a significant role in ecosystem development.

Guideline b. Prescribed burning will be utilized only when careful analyses indicates that it will be cost-effective and practical. This analysis will include consideration of air quality mitigating opportunities including increased removal of slash from the site, reduction of acres to be burned for hazard reduction and ignition and burning techniques to reduce fuel consumption.

Guideline c. Maintenance of air quality will be a key factor in planning prescribed fire use. Consideration will be given to air quality mitigating measures including burning during a longer season to spread emissions throughout the year, the avoidance of burning near recreational units during times of peak use, and coordination with State smoke management plans.

Standard 6-4. Prescribed burning on National Forest land in The Pacific Northwest Region should be planned to avoid or minimize smoke intrusion into sensitive areas defined in State smoke management plans.

Utility and Transportation Corridors

Standard 7-1. Existing and potential utility and transportation corridors will be identified in the Forest Plans. Existing corridors will be designated in the Forest Plans.

Guideline a. Forests will inventory corridors pursuant to standard definitions for utility corridor, existing utility corridor, new utility corridor, critical window and

transportation corridor as defined in the Regional Plan glossary.

Guideline b. Existing as well as potential utility and transportation rights-of-way will be analyzed relative to issues and concerns and resource management objectives.

Guideline c. Residual capacity of *existing* utility and transportation rights-of-way, which may be identified as corridors, will be identified. In this determination utility corridors will be considered to be *approximately* 600 feet, except where existing corridors are wider than 600 feet, in which case the actual width will apply.

Guideline d. Alternative off-Forest routes will be considered.

Standard 7-2. Utility and transportation corridors will be planned and allocated to consolidate the commitment of land and minimize ground and air disturbance.

Standard 7-3. A Regional process will be used to determine what and where *new* corridors and critical windows will be allocated pursuant to the following criteria:

- a. New proposals which cross multi-jurisdictional areas will be planned on an interagency basis.
- b. Interagency and inter-Regional groups will cooperatively develop the *process* to be used for evaluating such new proposals.
- c. Forest planners will apply this *process* in cooperation with the other involved agencies.

Northern Spotted Owl Habitat Management

Standard 8-1. The spotted owl will be considered a management indicator species in Forest planning. In order to fully evaluate the effects of spotted owl management, each Forest will, within the analysis of the management situation; (1) consider the following ranges of habitat acres and population levels; and (2) display the significant results in terms of RPA outputs and activities.

1. *Zero CFL acres.* No acres of commercial forest land will be assigned for spotted owl management. The effects on spotted owls will focus on the rate of decline of existing habitat and local extirpation through the planning period (2030) and habitat occurring in reserved and deferred areas.
2. *Minimum viable population with 300 acres of habitat.* The number of owl pairs managed will be at the minimum viable level. A nesting core area of 300 contiguous acres of old growth will be provided for each nesting pair.

3. *Minimum viable population plus 30 percent with 300 acres of habitat.* The number of owl pairs managed will be 130 percent of the minimum viable level. A nesting core area of 300 contiguous acres of old growth will be provided for each nesting pair.
4. *Minimum viable population plus 60 percent with 300 acres of habitat.* The number of owl pairs managed will be 160 percent of the minimum viable level. A nesting core area of 300 contiguous acres of old-growth will be provided for each nesting pair.
5. *Minimum viable population with 1,000 acres of habitat.* The number of owl pairs managed will be at the minimum viable level. A nesting core area of 300 contiguous acres of old growth will be provided for each nesting pair. In addition, 700 acres of old growth for foraging will be provided within 1.5 miles of the nest. The center of the nest core area should be used if the nest location is unknown. Old-growth for foraging does not have to be contiguous.
6. *Minimum viable population plus 30 percent with 1,000 acres of habitat.* The number of owl pairs managed will be 130 percent of the minimum viable level. A nesting core area of 300 contiguous acres of old-growth will be provided for each nesting pair. In addition, 700 acres of old growth for foraging will be provided within 1.5 miles of the nest. The center of the nest core area should be used if the nest location is unknown. Old-growth for foraging does not have to be contiguous.
7. *Minimum viable population plus 60 percent with 1,000 acres of habitat.* The number of owl pairs managed will be 160 percent of the minimum viable level. A nesting core area of 300 contiguous acres of old growth will be provided for each nesting pair. In addition, 700 acres of old-growth for foraging will be provided within 1.5 miles of the nest. The center of the nest core area should be used if the nest location is unknown. Old-growth for foraging does not have to be contiguous.

Table 37 provides a detailed assignment of the number of pairs of spotted owls and/or habitat acres (old-growth) specified in the seven foregoing levels.

The seven population and/or habitat levels will be tested through a range of preliminary alternatives varying from those producing large amounts of commodities to those providing principally amenity values. Preliminary alternatives at the upper end of the commodity production scale will evaluate spotted owl management reflecting low demands on the timber resource base. Preliminary alternatives at the amenity

end of the scale will include spotted owl management levels with the greatest demands on timber resources.

Minimum Viable Population Estimates

Discussion. A viable population is defined as the number of individuals, adequately distributed throughout their range, sufficient to perpetuate their existence in natural, self-sustaining populations. A minimum viable population is regarded as the extreme lower portion of that population.

Table 37, Column 2 depicts estimated, minimum viable populations at the 300-acre level for National Forests within the Pacific Northwest Region known to have spotted owl populations. Procedures used to determine the estimated minimum viable population are presented in Appendices D and E.

Standard 8-2. At least two Forest Plan alternatives will be brought forward from the Analysis of the Management Situation for evaluation. One of the alternatives will provide for the estimated minimum viable population assignment for the National Forests as shown in Table 37, Column 5. The other alternative will provide for the estimated minimum viable population plus 30 percent (Table 37, column 6). If possible, these alternatives should also meet assigned RPA outputs. Habitat characteristics presently considered necessary to support northern spotted owls are found in Sections 1111. through 1114.1 of the 1981 Proposed Revision of the Oregon Interagency Spotted Owl Management Plan, Appendix D.

Interim Direction. Until Forest Plans are approved, each National Forest with spotted owl populations will manage population numbers in compliance with interim direction given in Appendix C. Table C-1 (Appendix C) summarizes the populations to be managed in the interim. Adjustments in the assigned minimum viable population level may be made as Forest inventory data is updated.

Table 37 — Summary of Spotted Owl Habitat Acres and Population Levels, in Pairs, to Be Tested in Forest Planning

Oregon National Forests	1 Zero¹ CFL Acres	2 Minimum Viable Pop. 300 ac.	3 Minimum Viable Pop. Plus 30% 300 ac.	4 Minimum Viable Pop. Plus 60% 300 ac.	5 Minimum Viable Pop. 1,000 ac.	6 Minimum Viable Pop. Plus 30% 1,000 ac.	7 Minimum Viable Pop. Plus 60% 1,000 ac.
Deschutes		18	23	29	18	23	29
Mt. Hood		30	39	48	30	39	29
Rogue River		14	18	22	14	18	22
Siskiyou		31	40	50	31	40	50
Siuslaw		27	33	43	27	33	43
Umpqua		38	49	61	38	49	61
Willamette		98	127	157	98	127	157
Winema		7	9	11	7	9	11
Subtotal		263	338	421	263	338	421
Washington National Forests	Zero¹ CFL Acres	Minimum Viable Pop. 300 ac.	Minimum Viable Pop. Plus 30% 300 ac.	Minimum Viable Pop. Plus 60% 300 ac.	Minimum Viable Pop. 1,000 ac.	Minimum Viable Pop. Plus 30% 1,000 ac.	Minimum Viable Pop. Plus 60% 1,000 ac.
G. Pinchot		32	42	51	32	42	51
Mt. B.-Snoq.		49	64	78	49	64	78
Olympic		17	22	27	17	22	27
Wenatchee		14	18	22	14	18	22
Subtotal		112	146	178	112	146	178
Region Total		375	484	599	375	484	599

¹ No acres of commercial forest land will be specifically assigned for spotted owl management.

Monitoring and Evaluation

Introduction

Monitoring consists of collecting information from defined sources to measure the effects of Forest Service activities. It is intended to facilitate evaluations to determine whether planned objectives are being met. Monitoring associated with this Regional Plan will provide information relative to how well programs are operating in terms of program output objectives, expected program costs, and adherence to standards and guidelines. A summary of monitoring planned in connection with direction specifically established in this Regional Plan is shown on Table 38 Monitoring Plan.

Evaluation of monitoring results will indicate whether results of programs are within acceptable limits. Where deviations are beyond acceptable limits, evaluation will consider the significance of the deviations and whether (1) changes are needed in management direction or (2) an amendment or (3) revision of the Regional Plan or selected Forest Plans is required. Evaluation results may also be used to identify new or additional research needs.

Monitoring and Evaluation Process

Information called for in Table 38 on an annual reporting frequency will be assembled within 3 months after the close of a given fiscal year.

This information will be evaluated and an initial evaluation report provided to the Regional Forester. Where review indicates a need for further evaluation, the Regional Forester will assign the task to the appropriate staff group. Evaluations which disclose a possible need to either (1) change management direction, or (2) amend or revise plans will be referred again to the Regional Forester, along with alternative courses of action, for decision.

Information regarding Standards and Guidelines reported with management and activity reviews will be evaluated by the responsible review team. Where significant problems appear, they will be brought to the Regional Forester's attention for direction on the follow-up action to be taken.

Table 38 — Monitoring Plan — Pacific Northwest Regional Plan

(1) Monitoring Category	(2) Items to be Monitored and Evaluated	(3) Source of Information	(4) Who Will Gather Information	(5) Frequency of Sampling	(6) ¹ Prec. & Reliab. Expt.	(7) Reporting Frequency
1. Program Outputs	a. All output and activity items related to distribution of RPA targets	Attainment Reports	National Forests/ Regional Office	Quarterly/ Annually	M-H	Annually
2. Program Costs	a. Cost items listed in the RPA program	Program Accounting Data	National Forests/ Regional Office	Annually	M-H	Annually
	b. Total costs for each program element	Program Accounting Data	Regional Office	Annually	H	Annually
3. Standards & Guidelines	a. National Forest adherence to Standards & Guidelines provided in the Regional Plan	Manage- ment & Activity Records & Reviews	Regional Office Reviewers	Same as freq. of reviews for the programs & activities to which standards & guidelines relate	M	Summary included within Manage- ment & Activity Review reports.
	b. Northern Spotted Owl Habitat	Forest Monitoring Reports	Forest Biologists/ Regional Office	Annually	H	Annually
	c. Impact of Standards & Guidelines on National Forest & Regional programs, adjacent landowners, and local communities	Manage- ment & Activity Records & Reports	Regional Office Reviewers	Same as freq. of reviews for programs & activities to which standards & guidelines relate	M	Summary included within Manage- ment & Activity Review reports.
4. Economic and Social Impact on Regional Public	a. Payments to Counties	Receipts distribution data	Regional Office Fiscal Mangmt.	Annually	H	Annually

¹ Precision and Reliability Expected: L = Low, M = Moderate, H = High

of the ... and ...

... to ...

... to ...

...

...

...

...

...

...

...

Expected ...

List of Preparers

Core Team

Name	Expertise	Education Degree	Work Experience
Paul R. Canutt	Wildlife Biologist	BS	25 years
Kent T. Churchill	Land Management Planner	BS	24 years
Bruce E. Cooper	Recreation Specialist	BS	27 years
Gary E. Cooper	Lands & Minerals	BS	19 years
Alan Fox	Economist	PHD	20 years
Ronald S. Johnson	Timber Manager	BS	23 years
John H. Nunan	State & Private Forester	BS	23 years

Interdisciplinary Participants

Clarence E. Almen	Range Conservation	BS	29 years
Robert M. Beeman	Rights-of-Way, Lands	MS	48 years
Paul J. Brady	Program-Budget, Lands	BS	26 years
Richard H. Bryant	Energy Coordinator	MS	27 years
Stanley W. Carter, Jr.	State & Private Forester	BS	18 years
Frank Collett	Engineering Program	MS	22 years
John Deeming	Meteorology	MS	21 years
James Edgren	Reforestation Ecology	MS	27 years
William D. Green	Civil Rights	MS	20 years
James S. Hadfield	Forest Pathology	MF	14 years
Frederick C. Hall	Ecology	PHD	27 years
Gordon N. Haugen	Fish Habitat Management	MS	18 years
Loren D. Herman	Soil Science	BS	26 years
Allan J. Hessel	Transportation Planning	BS	15 years
Arnold G. Holden	Sociology	PHD	8 years
Kirk M. Horn	Wildlife Biology	MS	16 years
Robert A. Hribernick	Program-Budget; Range, Fish & Wildlife, Watershed.	BS	27 years
Dallas Hughes	Watershed Hydrology	MS	16 years
John Hughes	Timber Management	BS	23 years
Donna Lamb	Meteorologist	MS	8 years
Robert T. Meurisse	Soil Science	PHD	16 years
James Pollock	Landscape Management	MA	14 years
Fred W. Sprenger	Timber Sales	BS	29 years
Gerald W. Swank	Water Management	BS	26 years
Ronald C. Thompson	Program-Budget	MS	11 years
Gail Throop	History	MA	4 years
Asa D. Twombly	Silviculture	BS	26 years
Ron Walters	Landscape Management	BA	21 years
Leonard A. Volland	Ecology	PHD	21 years

Index

This index is comprehensive for the text and the glossary. **Bold-face** page numbers pertain to glossary definitions. Appendices B-G are not indexed.

Acre equivalent — **99**
 Activity — 19, 66, 92, **99**
 Agricultural Stabilization and Conservation Service — 46
 Air quality — 11, 19, 38, 42, 44, 87, 89
 Visability — 43
 Airshed — **99**
 Alaska — 54
 Aleutian Canada goose — 26
 Alternative — 2, 52, 59, 60, 65, 91, **99**
 Amenity — 5, 8, 92, **99**
 Anadromous fish — 19, 23, 26, 27, 29, 52, 55, 66, **99**
 Animal unit month (Aum) — 22, **99**
 Area planning and development (S&PF) — 47
 Assessment — 1, **99**

Background — **99**
 Bald eagle — 24
 Bear — 24
 Beaver — 24
 Bend-Redmond — 55
 Benefit-cost ratio —
 Big game — 8, 26, 44, 55, **99**
 Big horn sheep — 24
 Biological growth potential — 16, 18, 87, 88, **99**
 Biomass — 20, 40, 54, 55, **99**
 Blister rust — 20
 Blue mountains — 7, 61
 Bobcat — 24
 British Thermal Unit — 41
 Broadcast burn — **99**
 Brown trout — 26
 Bull Run watershed — 55
 Bureau of Economic Analysis — 7
 Bureau of Land Management — 13, 26, 33

California — 5, 54
 California brown Pelican — 26
 Canada — 56
 Capability — 15, 16, 18, 19, 34, 37, **99**
 Caribou — 24
 Cascade Head Experimental Forest — 55
 Cascade Range — 5-7, 12, 23, 26, 32, 41, 43, 45, 55, 60
 Cavity — 29, **100**
 Excavators — 29
 Nesters — 24
 Chargeable timber volume — **100**
 Chemicals — 19, 52, 56
 Chukar — 24

Civilian Conservation Corps — 45
 Class I areas — 43
 Class II areas — 43
 Clean Air Act — 42, 43, **100**
 Clearcut — 33
 Climate — 7, **100**
 Climax — **100**
 Climax species — **100**
 Coal — 40, 41, 60
 Coastal Douglas-fir zone — **100**
 Coast Range — 5-7
 Columbia River Basin Plan — 30
 Columbian white-tailed deer — 26
 Colville National Forest — 60
 Commercial forest land (CFL) — 5, 5, 11-14, 19, 20, 29, 33, 52, 56, 88, 89, 91, **100**
 Commercial thinning — 88
 Commodity — 8, 23, 31, 38, 91, **100**
 Comprehensive Employment and Training Act (CETA) — 45, 46
 Concern — 5, 19, 65, 89, **100**
 Congressionally classified and designated areas — **100**
 Consumptive use — **100**
 Cooperative fire and forestry (S&PF) — 47
 Cooperative Forestry Assistance Act — 33, 46-48
 Core area (northern spotted owl) — 89, 90, **100**
 Corridor — 89, **100**
 Corvallis, OR — 55
 Cost efficiency — 19, 89, **100**
 Cougar — 24
 Coyote — 24
 Created opening — 62, 88, **100**
 Critical window — 89, **100**
 Cultural resource — 11, 37, 38, 44, 53, **100**
 Cutthroat trout — 26

Decision criteria — **100**
 Deer — 23, 24, 25, 29
 Deferred forest land — 8, 11, 89, **100**
 Density biological population — **100**
 Deschutes National Forest — 43, 45, 91
 Designated areas (air quality) — 43, **100**
 Developed recreation — 34, 101
 Diameter classes — 12, 14, 62, **101**
 Disease — 14, 15, 19, 20, 34, 37, 45, 48, 50, 51, 56, 87
 Dispersed recreation — 9, 10, 34, **101**
 Diversity — 29, 61, **101**
 Dolly Varden — 26
 Douglas-fir — 5-7, 55, 61, 62, **101**
 Type — 87
 Subregion — 6, 12, 14
 Coastal Zone — 87
 Dove — 24
 Dwarf mistletoe — 56, 88
 Eastside forests — **101**

Economic — 7, 56, 93
 Ecosystem — 32, 42, 55, 61, **101**
 Ecotone — **101**
 Edge — 62, 88, **101**
 Effects — **101**
 Elk — 21, 23-25, 29, 59, 60
 Endangered species — 19, **101**
 Energy — 11, 20, 29, 36, 40, 41, 52, 54, 55, 59, 60
 Requirements — 39
 Entiat Experimental Forest — 55
 Entiat River — 31
 Environment — 9, 31, 54, 89, **101**
 Environmental analysis — **101**
 Environmental assessment — 61, 87, **101**
 Environmental documents — **101**
 Environmental Protection Agency — 43
 Epiphyte — **101**
 Even-aged silviculture — 20, 87, **101**
 Clearcutting — **102**
 Shelterwood cutting — 88, **102**
 Seed tree cutting — **102**
 Existing utility corridor — 89, **102**
 Extensive forest management — **102**
 Farmers Home Administration — 46
 Federal endangered species list — 26
 Fertilization — 19, 56, 88
 Final harvest — 88
 Fire — 14, 19, 21, 26, 29, 34, 37, 45, 47, 48, 50, 51, 56, 66, 88
 Management — 11, 20, 41, 66
 Fish — 1, 5, 7, 8, 11, 29, 31, 50, 54-56, 66, 88, **102**
 Habitat — 23, 30, 40, 44, 45
 Flood plains — **102**
 Forage — 5, 19, 20, 21, 23, 24, 25, 55
 Foreground — **102**
 Forest and Rangeland Renewable Resources Planning Act — **102**
 Forest pest management (S&PF) — 47
 Forest Products Laboratory — 53, 54
 Forest product utilization — 16, 20, **102**
 Forest residues, see Residues — **102**
 Forest types — 87, **102**
 Fremont National Forest — 44, 60
 Fuelwood — 8, 14
 Fuelbreaks and fuel treatment — 66
 Further planning areas — 8, 32, 34, **102**
 Genetic integrity — **102**
 Geographic stretch — **102**
 Geography — 5
 Geothermal — 38, 40, 41, 60, 61
 Gifford Pinchot National Forest — 5, 45, 59, 60, 91

Goal — 20, 59, **102**
 Goods and services — 8, 20, 54, 57, **102**
 Grand fir — 62
 Grizzly bear — 24
 Group-selection — **102**
 Grouse — 24
 Guideline — 2, 19, 87, 92, 93, **102**
 Habitat — 20, 23, 24, 26, 29, 30, 55, 59, 60, 89, 91, 93, **102**
 Hells Canyon National Recreation Area — 32
 Herbaceous — **102**
 Heterozygosity — **102**
 Hispanic — 8
 H. J. Andrews Experimental Forest — 55
 Human and community development — 5, 11
 Human resources — 45, 46, 66
 Hydrologic — 19, **102**
 Hydroelectric — 40, 41, 60, 61
 Idaho — 5, 32
 Implementation — 31, **102**
 Inbreeding depression — **103**
 Indians — 8, 29, 37, 46
 Reservations — 8
 Industrial private forest lands — 14, 26, 41, 52, **103**
 Insects — 14, 15, 19-21, 34, 37, 45, 48, 50, 51, 55, 56, 62, 87
 Integrated pest management — 46, 56, **103**
 Intensive forest management — 19, 20, 23, **103**
 Interdisciplinary approach — 42, **103**
 Intermingled ownerships — 11, 40, **103**
 Interstate 5 — 8
 Irretrievable — **103**
 Irreversible — **103**
 Issue — 2, 5, 19, 31, 36, 38, 40-44, 53, 65, 89, **103**
 Job Corps — 45, 46
 Kit Fox — 26
 Knutsen-Vandenburg funds — 15
 Kokanee — 26
 Kuchler vegetative types — 62
 La Grande, OR — 55
 Land exchange — 19, 44
 Land ownership pattern — 11, 44, 48, **103**
 Livestock — 20, 21, 23, 31, 55, 59, 62, 88
 Forage — 9, 10
 Grazing — 29, 31, 55, 57, 59, 66
 Lodgepole pine — 7
 Long-term — **103**
 Long-term sustained yield capacity — **103**
 Malheur National Forest — 5, 60

- Management concern — 5, 11, 19, 29, 42, 57, **103**
- Management direction — **103**
- Management intensity — 87, 88, **103**
- Management practice — 20, 44, 87, **103**
- Management prescription — 40, **104**
- Market resources — 9, 10, 21-23, 25, 57, **104**
- Mass wasting — 31, **104**
- Mature — 62, **104**
- Maximum modification — **104**
- McFarlane's four o'clock — 26
- Mean annual increment — 62, 87, 89
- Mercury — 38
- Middleground — **104**
- Minerals — 5, 11, 48, 50, 66
- Leases — 66
- Minimum viable population — 89, 90, 91, **104**
- Mitigation — 19, 60, 89, **104**
- Modification — **104**
- Molybdenum — 38
- Monitoring — 20, 31, 39, 43, 47, 56, 92, 93, **104**
- Mountain hemlock — 63
- Mount St. Helens — 5, 36
- Mt. Baker-Snoqualmie National Forest — 44, 45, 91
- Mt. Hood National Forest — 59, 60, 91
- Multiple use — 5, 23, 38, 44, 47, **104**
- Municipal supply watershed — 19, 20, 30, 31, 42, 52, **104**

- National Ambient Air Quality Standards (NAAQS) — 43, **104**
- National Forest Management Act (NFMA) — 2, 29, 40, 87, **104**
- National Forest System land — 1, 5, 11, 12, 20, 23, 31, 34, 37, 40, 44, 87, **104**
- National Park Service — 33
- National Register of Historic Places — 37, 38
- Natural gas — 40, 41, 61
- Natural opening — 88
- New utility corridor — 89, **104**
- Nickel — 38
- Nitrogen-fixing (nitrogen fixation) — 55, 56, **104**
- No action alternative — **104**
- Nonattainment areas — 43, **104**
- Nonchargeable timber — **104**
- Nonconsumptive use — 27, **104**
- Nondeclining even flow — 60, **105**
- Departure — 20, 60, **105**
- Nongame — 29, **105**
- Nonindustrial private forest land — 14, 26, 31, 36, 45, 52, **105**
- Nonmarket — 9, 10, 21-23, 25, 57, **105**
- Northcentral Oregon — 31
- Northeastern Oregon — 7, 23, 59
- Northeastern Washington — 7
- Northern spotted owl — 26, 29, 55, 61, 62, 87, 89, 91, 93
- ORV, see Off road vehicle
- Objective — 2, 59, **105**
- Ochoco National Forest — 60
- Off road vehicle — 36
- Oil — 40, 41, 61
- Okanogan-Methow River Basin — 30, 43
- Okanogan National Forest — 44, 45, 59, 60
- Old-growth — 8, 16, 24, 27, 29, 44, 52, 57, 59, 61, 89, 90, **105**
- Olympic National Forest — 32, 60, 87, 91
- Olympic rain forest — 5
- Opening — 87, 88
- Created — 87, 88
- Dispersion — 87
- Natural — 88
- Size — 87
- Opportunity — 11, 23, 29, 36, 38-46, 59, **105**
- Optimum density — **105**
- Oregon — 5, 7, 8, 13-16, 21, 26, 29, 30, 31, 33, 43, 48, 50, 53-55
- Oregon Department of Environmental Quality — 43
- Oregon Department of Fish and Wildlife — 59
- Oregon Department of Forestry — 41, 52
- Oregon Dunes National Recreation Area — 32
- Oregon silverspot butterfly — 26
- Oregon Spotted Owl Management Plan — 91
- Oregon Student Public Interest Research Group — 62
- Oregon Wilderness Coalition — 87
- Output — 8, 15, 34, 37, 66, 93, **105**
- Target — 2, 19, 20
- Overmature — 62, **105**

- Pacific Crest National Scenic Trail — 32
- Pacific Northwest Forest and Range Experiment Station — 5, 54, 55
- Pacific Northwest River Basin Report — 61
- Palouse River — 31
- Partial retention — 8, 33, **105**
- Particulates — 43, **105**
- Peregrine falcon — 26
- Pesticides — 47
- Pheromones — 56
- Pigeon — 24
- Pileated woodpecker — 61, 62
- Planning direction — 59
- Ponderosa pine — 7, 56, 62
- Subregion — 6, 12, 14
- Population — 8
- Portland, OR — 5, 7, 55
- Precommercial thinning — 15, 88
- Prescribed fire — 14, 42, 43, 55, 56, 89
- Presuppression — **105**
- Primitive recreation — 9, 10, **105**
- Pringle Falls Experimental Forest — 55
- Production potential — **105**
- Productive forest land — 8, 11, **105**
- Pronghorn — 24
- Public issue — 5, 11, 41, 57, **105**
- Public participation activities — **106**
- Puget trough — 5
- Puget Sound-Seattle — 7
- Purchaser credit — **106**

- Quaking aspen — 62

- RARE I and II, see Roadless Area Review and Evaluation — 19, 32, 34, **106**
- RPA Assessment and Program — 1, 2, 16, 19, 20, 22, 23, 27, 28, 36, 42, 47-49, 51-54, 59, 60, 65, 89, 91, 93, **106**
- Raccoon — 24
- Rainbow trout — 26
- Range — 1, 11, 19-21, 23, 48, 50-55, 59, 60
- Real dollar value — **106**
- Recreation — 5, 8, 11, 19, 29, 31, 37, 38, 40, 48, 50-55
- Outdoor — 1, 19, 36, 59
- Primitive — 35, 36, 57, 59
- Dispersed — 36, 55, 66
- Developed — 36, 44, 45, 55, 66
- Demand — 34, 35
- Recreation capacity — 34, **106**
- Recreation visitor day (RVD) — **106**
- Red fir — 62
- Reforestation — 15, 16, 20, 43, 46, 66, 88, **106**
- Regeneration — 21, 23, 42, 52, **106**
- Regeneration cut — 88, **106**
- Region — **106**
- Regulations — **106**
- Regulated timber management — 11, 20, **106**
- Standard component — 11, **106**
- Marginal component — 11, **106**
- Special component — 11, **106**
- Release and weeding — 88
- Research — 1, 2, 5, 30, 37, 46, 47
- Research natural area — 8, 55, 61
- Research work unit — 53
- Reserved forest land — 8, 11, 89, **106**
- Residual stand — 20, **106**
- Residue loading — 55, **106**
- Residue — 44, 56
- Resource use and development opportunities — **107**
- Responsible official — **107**
- Retention — 8, 33, **107**
- Riparian areas — 23, 24, 26, 29, 30, 31, 40, 52, 55, 88, **107**
- Road construction — 8, 19, 26, 31, 66, 88
- Roadless area — 19, **107**
- Rock resource — 11

- Root rot — 88
- Rogue River National Forest — 59, 60, 91
- Rotation age — **107**

- S&PF, see State and Private Forestry — **107**
- Salmon — 27
- Salvage — 20, 88
- Sanitation salvage — **107**
- Saprophyte — **107**
- Saturation density — **107**
- Science and Education Administration (SEA) — 53
- Sea otter — 26
- Seattle, WA — 7, 55
- Second growth — **107**
- Seed tree cutting —
- Senior Conservation Employment Program — 46
- Sensitive species — 23, **107**
- Seral — **107**
- Series — **107**
- Shade tolerant — **107**
- Sheep — 23
- Shelter trees — 88, **107**
- Shelterwood cut — 56, 88
- Shelton Cooperative Sustained Yield Unit — 87
- Short-term — **107**
- Sikes Act —
- Silver fir — 62
- Silviculture — **107**
- Silvicultural system — 20, 87, **107**
- Site preparation — 88
- Siskiyou National Forest — 7, 32, 60, 91
- Sisuslaw National Forest — 7, 26, 32, 60, 91
- Skyline deflection — **107**
- Skyline logging — **107**
- Skyline tailhold — **107**
- Slash — 19, 42, 44, 89, **108**
- Small game — 26, **108**
- Smoke management — 52
- Plans — 43, 89
- Snag management — 24, 29, 62
- Snake River — 32
- Society of American Foresters (SAF) Forest and Cover Types — **108**
- Socio-economic — 56, 93, **108**
- Softwood sawtimber — 12, 14
- Soils — 6, 7, 31, 39, 40, 45, 50, 51, 54-56, 66, 87, 88
- Productivity — 19
- Soil Conservation Service — 46
- Solar energy — 41, 60, 61
- Soma (spotted owl management area) — **108**
- Southcentral Oregon — 7
- Southeastern Washington — 23, 31
- Spokane — 43
- Squirrel — 24
- Stand — 62, 63, 87, 88, **108**
- Standard — 2, 11, 19, 87, 92, 93, **108**

- Starkey Experimental Forest and Range — 55
- State and Private Forestry — 1, 5, 33, 46
- State Implementation Plans — 43
- State of vegetation — 87
- Stocking density — 57, 88, **108**
- Subsistence density — **108**
- Successional stage — **108**
- Suitability — 19, **108**
- Suppression — 19, 42, **108**
- Sustained-yield — 5, **108**

- Thermal cover — **108**
- Threatened and endangered species — 8, 19, 23, 26, 29, 52, 57, **108**
- 3-toed woodpecker — 61
- Timber — 1, 7, 9-11, 14, 16, 18, 23, 26, 29, 31, 33, 36, 44, 48, 50-54, 56, 57, 59, 60, 66, 81
- Timber harvest schedule — 23, **108**
- Timber management — 26, 29, 33, 56, 59
- Timber production — 29, 39, 42, 56, **108**
- Timber productivity — **108**
- Timbershed — **108**
- Timber stand improvement — 16, 20, 46, 48, 50-52, 66, **108**
- Timber supply — 14, 17, 19, 36, 47, 53, 60
- Total suspended particulates (TSP) —
- Transportation corridor — 61, 87, 89, **109**
- Transportation system — 20, 36, 38, 39, 44
- Tree improvement — 88

- Umatilla National Forest — 60
- Umpqua National Forest — 60, 91
- Uneven-aged silviculture — 20, 87, **109**
 - Individual tree selection cutting — **109**
 - Group selection cutting — **109**
- Unproductive forest land — 11, **109**
- Unregulated timber management — 11, 20, **109**
- Uranium — 38, 41
- Urban forestry — **109**
- USDA River Basin Studies — 30, 31
- U.S. Geological Survey — 41
- Utility corridor — 61, 87, 89, **109**
- Utilization — 50, 51, 53, 56, 61, 87, 89
 - Standards — 87, 88, **109**

- Viable population — 91
- Visual quality objective — 32, 33, 36, 88, **109**
- Visual resource — 38, 44, 56, 59, 87, **109**

- Walla-Waitman National Forest — 60
- Washington — 5, 8, 13-16, 21, 29-31, 33, 43, 48, 51, 53, 55
- Washington Department of Ecology — 43
- Washington Department of Natural Resources — 41, 43, 52
- Water — 1, 5-7, 11, 26, 30, 31, 48, 51, 54-56, 66, 88
 - Quality — 20, 30, 31, 36, 38, 40, 44, 55, 56
- Water Resource Council — 31
- Watershed — 11, 19, 30, 31, 46, 88
 - Management — 30, 31
- Wenatchee National Forest — 5, 45, 59, 60, 91
- Wenatchee, WA — 55
- Western hemlock — 7, 55
- Western snowy plover — 26
- Western spotted frog — 26
- Western spruce budworm — 56
- Western Washington — 43
- Westside forests — **109**
- Wetlands — **109**
- White fir — 5
- Wilderness — 1, 5, 9, 10, 32, 34-36, 42-44, 54, 61, 66, **109**
- Wildfire — 14, 19, 29, 41-44, 87, 89, **110**
- Wildland — **110**
- Wildlife — 1, 5, 9, 11, 19, 20, 23, 26, 29, 31, 50-56, 60-62, 66, 87, 88
 - Forage — 10, 25
- Wildlife habitat — 19, 23, 26, 29, 30, 40, 42, 44, 45, 59, 61, 66, 88
- Willamette National Forest — 45, 59, 60, 91
- Willamette valley — 5, 7, 30, 43
- Wind (energy) — 40, 41, 60, 61
- Windfall — 62, **110**
- Wind River Experimental Forest — 55
- Winema National Forest — 60, 91
- Wood — 5, 41, 54
- Yarding — 39, 40, 56, **110**
- Young Adult Conservation Corps — 45, 46
- Youth Conservation Corps — 45, 46

Appendices

Appendix A.	Glossary
Appendix B.	Research Needs — Northern Spotted Owl
Appendix C.	Interim Direction — Spotted Owl Habitat Management
Appendix D.	Procedure Used for Determining Spotted Owl Populations and Potentials
Appendix E.	Procedure for Calculation of Spotted Owl Population Levels — Willamette NF
Appendix F.	Oregon Interagency Spotted Owl Management Plan, Revised 1981
Appendix G.	Discussion of the Silvicultural System Criteria

Appendix A

Glossary

Acre Equivalent A figure used to adjust actual acres of habitat improvement or improvement structures to reflect overall habitat benefits derived. It reflects the zone of influence of the habitat improvement for the target species. For example, a single water development for upland game birds has an acre equivalent of 160, whereas a single water structure for big game has a value of 640 because it has a larger zone of influence for the more mobile big game animals.

Activity The work processes or management practices that are conducted to produce, enhance, or maintain outputs or achieve administrative and environmental quality objectives. An activity can generate multiple outputs.

Air Quality Maintenance Areas Any Region where existing (measured or estimated) ambient levels of an air pollutant exceed the levels specified by an applicable standard and where an emission reduction and maintenance plan is required as part of the State implementation plan.

Airshed A geographical area, the whole of which, because of topography, meteorology, and climate, shares the same air.

Alternative The different means by which objectives or goals can be attained.

Amenity An object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity value is typically used in land use planning to describe those resource properties for which market values (or proxy values) are not or cannot be established.

Anadromous Fish Those species of fish which mature in the sea, and migrate into streams to spawn. Salmon, steelhead, and shad are examples.

Animal Unit Month (AUM) The amount of feed or forage required by one mature (1,000 lb.) cow or equivalent for 1 month.

Assessment The Renewable Resource Assessment required by the RPA.

Background The visible terrain beyond the foreground and middleground where individual trees are not visible but are blended into the total fabric of the stand. (see foreground and middleground.)

BTU British Thermal Unit — The amount of heat required to raise the temperature of one pound of water one degree Fahrenheit.

Big Game Those species of large mammals normally managed as a sport hunting resource.

Biological Growth Potential The average net growth of wood fiber attainable in a fully stocked natural area of forest land.

Biomass The total quantity (at a given time) of living organisms of one or more species per unit of space (species biomass), or of all the species in a biotic community (community biomass).

Broadcast Burn Allowing a controlled fire to burn over a designated area within well-defined boundaries, for reduction of fuel hazard, as a silvicultural treatment, or both.

CFL Commercial Forest Land (See definition).

Capability The potential of an area of land to produce resources, supply goods and services, and allow resource uses at an assumed management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils and geology, as well as the application of management practices, such as silviculture or protection from fire, insects, and disease.

Cavity The hollow excavated in trees by birds or other natural phenomena; used for roosting and reproduction by many birds and mammals.

Chargeable Timber Volume The timber removed from regulated forest land that contributes to meeting the annual sustained yield capacity.

Clearcut The removal of the existing timber stand in one operation and establishment of the new stand by natural or artificial means.

Climax The highest ecological development of a plant community capable of perpetuation under the prevailing climatic and edaphic conditions.

Climax Species Those species which dominate the stand in either numbers per unit area or biomass at climax.

Coastal Douglas-fir Zone The area west of the crest of the Cascade Mountain Range in the States of Oregon and Washington.

Commercial Forest Land (CFL) Forest land which is producing or capable of producing crops of industrial wood and has not been reserved or deferred. This includes areas suitable for management to grow crops of industrial wood generally of a site quality capable of producing in excess of 20 cubic feet per acre of annual growth. This includes both accessible and inaccessible areas. Permanently inoperable or nonstockable areas are excluded because they are not suitable for silvicultural management. Conversely, nonstocked areas which are stockable and otherwise meet this definition are included.

Commodity A transportable resource product with commercial value; all resource products which are articles of commerce.

Concern A point, matter, or question raised by management which must be addressed in the planning process.

Congressionally Classified and Designated Areas Areas which require congressional enactment for their establishment, such as National Wildernesses, National Wild and Scenic Rivers, National Recreation Areas.

Consumptive Use Those uses of a resource that reduce the supply. For example, some consumptive uses of water are: irrigation, domestic, and industrial.

Core Area (As related to the spotted owl). An area encompassing at least 300 contiguous acres of old growth suitable for nesting and reproduction. The area consists of a pair's territory, in part, the nest site, and principle roost areas.

Corridor A linear strip of land which has ecological, technical, economic, social, or similar advantages over other areas for the present or future location of transportation or utility lines.

Cost Efficiency A comparative measure of economic efficiency determined by maximizing the present net worth of an alternative, subject to meeting the objectives of the alternative.

Created Opening Openings in the forest created as the results of even-aged silviculture through clear cutting, group selection or shelterwood regeneration systems.

Critical Window A control point or area (such as a mountain pass) not to be designated within an existing utility corridor, but needed to retain future new utility corridor options.

Cultural Resource Evidence of human behavior on National Forest System lands. The disciplines of archeology, architecture, ethnology, and history are all relevant.

Decision Criteria Essentially the rules or standards used to evaluate alternatives. They are measurements or indicators that are designed to assist a decisionmaker to identify a preferred choice from an array of possible alternatives.

Deferred Forest Land Productive forest land that has been administratively identified for study as possible addition to the National Wilderness Preservation System, or otherwise withdrawn from timber utilization under authority granted in the Code of Federal Regulations.

Density Biological Population The number or size of a population in relation to some unit of space. It is usually expressed as the number of individuals, or the population biomass per unit area or volume. (Odum, E. 1960. Fundamentals of Ecology. W. B. Saunders Co:149-157).

Designated Area (Air Quality) Those areas delineated in the Oregon and Washington Smoke Management Plans as principle population centers of air quality concern.

Developed Recreation Outdoor recreation requiring significant capital investment in facilities to handle a concentration of visitors on a relatively small area. Examples are ski areas, resorts and campgrounds.

Diameter Classes A classification of trees based on diameter outside bark measured at breast height (4½ feet above the ground). D.b.h. is the common abbreviation for "diameter at breast height." When using 2-inch diameter classes, the 6-inch class, for example, includes trees 5.0-through 6.9-inch d.b.h. inclusively.

Dispersed Recreation Outdoor recreation in which visitors are diffused over relatively large areas. Where facilities or developments are provided, they are more for access and protection of the environment than for the comfort or convenience of the people.

Diversity The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

Douglas-fir Type An association of tree species where Douglas-fir is recognized as one of the principle seral species.

Eastside Forests The 10 National Forests of the Pacific Northwest Region that lie east of the Cascade Mountain Range crest (Colville, Deschutes, Fremont, Malheur, Ochoco, Okanogan, Umatilla, Wallowa-Whitman, Wenatchee and Winema National Forests).

Ecosystem An association of interactive organisms and their environment perceived as a single entity.

Ecotone The area influenced by the transition between plant communities or between successional stages or vegetative conditions within a plant community.

Edge The place where plant communities meet or where successional stages or vegetative conditions within plant communities come together.

Effects Environmental consequences as a result of the proposed action. Included are: a) Direct effects, which are caused by the action and occur at the same time and place; b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Effects and impacts as used in this statement are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), esthetic, historic, cultural, economic, social, or health, whether direct, indirect or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effects will be beneficial (40 CFR 1508.8).

Endangered Species Any species of animal or plant which is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of Interior as endangered in accordance with the 1973 Endangered Species Act.

Environment The aggregate of physical, biological, economic, and social factors affecting organisms in an area.

Environmental Analysis An analysis of alternative actions and their predictable short- and long-term environmental effects which include physical, biological, economic, social, and environmental design factors and their interactions.

Environmental Assessment Is the concise public document required by the regulations for implementing the procedural requirements of NEPA (40 CFR 1508.9).

Environmental Documents A set of concise documents to include, as applicable, the environmental assessment, environmental impact statement, finding of no significant impact, or notice of intent.

Epiphyte A plant that grows upon another plant, and is nonparasitic. Most of its moisture and nutrients are derived from the atmosphere.

Even-Aged Silviculture The combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages (and therefore tree sizes) throughout the forest area. Regeneration in a particular stand is obtained during a short period at or near the time that the stand has reached the desired age or size and is harvested. Clearcutting, shelterwood cutting, seed tree cutting, and their many variations are the cutting methods used to harvest the existing stand and regenerate a new one. In even-aged stands, thinnings, weedings, cleanings, and other cultural treatments between regeneration cuts are often beneficial. Cutting is normally regulated by scheduling the area of harvest cutting to provide for a forest that contains stands having a planned distribution of age classes.

Clearcutting — The removal, in a single cut, of all trees in stands larger than seedlings.

Shelterwood Cutting — The removal of all trees in a series of two or more cuts over a period of not more than 20 years.

Seed Tree Cutting — Similar to clearcutting, except that a few of the better trees of the desired species are left scattered over the area to provide seed for regeneration.

Existing Utility Corridor A strip of land containing one or more existing linear utility rights-of-way, which in the current Forest planning are being included within the designation of a full 600-foot utility corridor, in order to facilitate future authorization of additional utility rights-of-way.

Extensive Forest Management A low investment level of management on regulated timber lands that requires initial harvest, regeneration and final harvest. Some precommercial thinning may be done to prevent stagnation and disease buildup.

Flood Plains Lowland and relatively flat areas adjoining inland and coastal water including as a minimum, that area subject to one percent or greater chance of flooding in any given year. Flood prone wetlands and sinkholes, and sheet flow or shallow flooding areas such as debris cones or alluvial fans built up by material carried by mountain streams, are special flood plain areas (Executive Order 11988).

Forage Forage refers specifically to all browse and nonwoody plants that are available to livestock or game animals and used for grazing or harvested for feeding.

Foreground A term used in visual management to describe the stand of trees immediately adjacent to a high value scenic area, recreation facility or forest highway (see background, middleground).

Forest Residues (Logging) The unused portions of sawtimber and poletimber trees cut or killed by logging.

Forest Types A classification of forest land based upon the tree species presently forming a plurality of stocking. For poletimber size trees and larger, stocking is determined from basal area occurrence and for trees less than 5.0 inches d.b.h. from number of trees.

FPU Forest Product Utilization — A program of utilization during the cutting and removal of forest products that have some personal or commercial value.

Further Planning Areas Areas designated by the RARE II process for further study to determine their use for wilderness or other resource management and development. This will be done during the development of Forest Plans.

Genetic Integrity Refers to a normal, healthy genetic pool (foundation) within a biological population to provide for a long-term maintenance and survival of the species. Of specific concern in this work, is to provide management direction to prevent loss of genetic variance (heterozygosity) and avoid inbreeding depression; an important part of a given population's genetic integrity within the gene pool.

Geographic Stretch A term used to denote the spread (distribution) of active SOMAs geographically over the range.

Goal A concise statement of the state or condition that a land and resource management plan is designed to achieve. A goal is usually not quantifiable and may not achieve a specific date for completion.

Goods and Services The various outputs produced by forest and range land renewable resources. The tangible and intangible values of which are expressed in market and nonmarket terms.

Group-Selection A modification of the selection system in which trees are removed in small groups at a time.

Guideline An indication or outline of policy or conduct.

Habitat The natural environment of a plant or animal.

Herbaceous An adjective describing seed producing plants that do not develop persistent woody tissue but die down at the end of the growing season.

Heterozygosity Genetic variance. Data from natural populations reflects strong support for the theory that heterozygous individuals have a greater viability and often fecundity than do homzygous individuals; (Soule, M. and B. Wilcox. Conservation Biology, an evolutionary—ecological perspective. 1980:151-171.)

Hydrologic Pertaining to the quantity, quality and timing of water yield from forested lands.

Implementation Those activities necessary to respond to the approved land and resource management plan.

Inbreeding Depression In wildlife populations, the occurrence of viable offspring decreases as inbreeding increases. The effects of inbreeding depression may be represented by discussing three parameters: 1) Survival rates. There is a failure of offspring to survive to maturity. 2) Natality success or "fecundity depression." Wildlife populations which are inbred are more likely to be sterile than outbred populations. Also, inbred parents are poorer parents than outbred parents. 3) "Sex ratio depression." The male of the species becomes more common among surviving offspring as inbreeding increases. (Soule, M. and B. Wilcox. Conservation Biology, an evolutionary—ecological perspective. 1980:209-224).

Industrial Private Forest Lands Lands owned by companies or individuals operating wood-using manufacturing facilities.

Integrated Pest Management A process in which all aspects of a pest-host system are studied and weighed to provide the resource manager with information for decisionmaking. Integrated pest management is, therefore, a part of forest or resource management. The information provided includes the impact of the unregulated pest population on various resource values, alternative regulatory tactics and strategies, and benefit/cost estimates for these alternative strategies. Regulatory strategies are based on sound silvicultural practices and ecology of the pest-host system. Strategies consist of a combination of tactics such as stand improvement plus selected use of pesticides. The overriding principle in the choice of strategy is that it is ecologically compatible or acceptable.

Intensive Forest Management A high investment level of timber management that envisions initial harvest, regeneration with genetically improved stock, control of competing vegetation, fill in planting, precommercial thinning as needed for stocking control, one or more commercial thinnings, and final harvest.

Interdisciplinary Approach The utilization of individuals representing two or more areas of knowledge and skills focusing on the same tasks, problem, or subject.

Intermingled Ownerships Lands within the National Forest boundaries or surrounded by National Forest lands that are owned by private interests or other government agencies. These lands are quite often in checkerboard ownership patterns due to early land grants.

Irretrievable Applies to losses of production, harvest or use of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost while an area is used as a winter sports site. If the use is changed, timber production can be resumed. The production lost is "irretrievable," but the action is not irreversible.

Irreversible Applies primarily to the use of nonrenewable resources, such as minerals or cultural resources or to those factors which are renewable only over long time spans, such as soil productivity. "Irreversible" also includes loss of future options.

Issue A point, matter, or question of public discussion or interest to be addressed or decided through the planning process.

Kuchler Vegetative Types Potential natural vegetation of the coterminous United States, classified by Kuchler.

Land Ownership Pattern The National Forest System resource land base in relation to other land ownerships within given boundaries.

Long-Term Action governed by the plan generally will take place over a period longer than 5 years from the present.

Long-Term Sustained Yield Capacity The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified intensity of management consistent with multiple use objectives.

M Thousand.

MBF Lumber or timber measurement term. One thousand board feet.

MM Million.

Management Concern An issue or problem requiring resolution or condition constraining management practices identified by the Interdisciplinary Team.

Management Direction A statement of multiple use and other goals and objectives, the management prescriptions, and the associated standards and guidelines for attaining them.

Management Intensity The relative cost of a possible management direction and/or management practice.

Management Practice A specific action, measure, or treatment, for example, tree planting.

Management Prescription Management practices selected and scheduled for application on a specific area to attain multiple use and other goals and objectives.

Market Resources Products derived from renewable and nonrenewable resources that have a well established market value, i.e., forage, timber, water, minerals.

Mass Wasting A general term for any of the variety of processes by which large masses of earth material are moved downslope by gravitational forces — either slowly or quickly.

Mature The stage at which a tree has attained full development, particularly height, and is in full seed production.

Maximum Modification A visual quality objective meaning man's activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.

Mean Annual Increment The total increment up to a given age divided by that age.

Middleground The visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly from the stand.

Minimum Viable Population The low end of the viable population range.

Mitigation Actions to avoid, minimize, reduce, eliminate, or rectify the impact of a management practice.

Modification A visual quality objective meaning man's activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color and texture. It should appear as a natural occurrence when viewed in foreground or middleground.

Monitoring A process to collect significant data from defined sources to identify departures or deviations from expected plan outputs.

Multiple Use The management of all the various renewable surface resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions;

that some lands will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

Municipal Supply Watershed A watershed which provides water for human consumption where Forest Service management could have a significant effect upon the quality of water at the intake point and that provides water utilized by a community or any other public water system regularly serving at least 25 individuals at least 60 days out of the year or provides at least 15 service connections.

NAAQS National Ambient Air Quality Standards.

NEPA National Environmental Policy Act of 1969.

NF National Forest.

NFMA National Forest Management Act of 1976.

National Forest System Land Federal lands which have been designated by Executive Order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service including experimental areas and Bankhead-Jones Title III lands.

New Utility Corridor A strip of land containing no existing linear utility right-of-way, but warranting designation as a full corridor.

Nitrogen-Fixing (Nitrogen Fixation) Conversion of free nitrogen (N_2) into combined forms useful in nutrient cycles and other functions in the biosphere.

No Action Alternative The most likely condition expected to exist in the future if current management direction would continue unchanged.

Nonattainment Areas An area that has been identified in the State Implementation Plan where at least one of the national air quality standards is violated.

Nonchargeable Timber Timber volume removed from regulated and unregulated forest land that does not contribute to annual sustained yield capacity.

Nonconsumptive Use Those uses of resources that do not reduce the supply. For example: Nonconsumptive uses of water include hydroelectric power generation, boating, swimming, etc.

Nondeclining Even Flow Nondeclining even flow is the quantity of timber which can be sold from each National Forest equal to or less than a quantity which can be removed from such forest annually in perpetuity on a sustained-yield basis.

Departure. In order to meet overall multiple-use objectives, the Secretary may establish an allowable sale quantity for any decade which departs from the projected long-term average sale quantity that would otherwise be established.

Nongame Species of animals which are not managed as a sport hunting resource.

Nonindustrial Private Forest Land Those forest lands owned by companies or individuals who do not own or operate wood-using plants manufacturing facilities.

Nonmarket Products derived from National Forest resources that do not have a well established market value, for example, recreation, wilderness, wildlife.

Optimum Density For wildlife, the maximum rate of animal stocking possible without inducing damage to vegetation or related resources; may vary from year-to-year because of environmental and/or population factors (Leopold, A. 1933. Game Management).

ORV Off Road Vehicle — Vehicles such as trail motorcycles, all terrain vehicles, fourwheel drives and snowmobiles.

Objective A specified statement of measurable results to be achieved within a stated time period. Objectives reflect alternative mixes of all outputs or achievements which can be attained at a given budget level. Objectives may be expressed as a range of outputs.

Old Growth An old-growth stand is defined as any stand of trees 10 acres or greater generally containing the following characteristics: 1) Stands contain mature and overmature trees in the overstory and are well into the mature growth stage; 2) Stands will usually contain a multi-layered canopy and trees of several age classes; 3) Standing dead trees and down material are present; and 4) Evidence of man's activities may be present but do not significantly alter the other characteristics and would be a subordinate factor in a description of such a stand.

Opportunity Circumstances that are judged to make certain actions possible with acceptable probability of success, advantage, or gratification.

Output The goods, end products, or services that are purchased, consumed, or utilized directly by people. Goods, services, products, and concerns produced by activities which are measureable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. A broad term for describing any result, product, or service that a process or activity actually produces.

Overmature The stage at which a tree declines in vigor and soundness, i.e., past culmination of height growth.

PAOT Persons At One Time — Public recreational measurement term. The number of people in an area or using a facility at the same time. Generally used as "maximum PAOT" to indicate capacity of an area or facility to support peak usage loads.

Partial Retention A term used to define a degree of visual quality. In general, man's activities may be evident but subordinate to the characteristic landscape.

Particulates A component of polluted air consisting of any liquid or solid particles suspending or falling through the atmosphere.

Precommercial Thinning The practice of removing some of the trees less than merchantable size from a stand so that the remaining trees will grow faster.

Prescribed Fire Prescribed fire is a fire burning under specified conditions which will accomplish planned objectives in strict compliance with an approved plan. While ignition may be either planned or unplanned, the conditions under which the burning takes place and the expected results are specific, predictable and measurable.

Presuppression Activities in advance of fire occurrence to assure effective suppression action.

Primitive Recreation Those types of recreational activities associated with unroaded land — e.g., hiking, backpacking, cross-country travel.

Production Potential The capability of the land or water to produce life-sustaining features (forage, cover, aquatics).

Productive Forest Land See Commercial Forest land.

Public Issue A subject or question of widespread public interest relating to management of National Forest System lands identified through public participation.

Public Participation Activities Meetings, conferences, seminars, workshops, tours, written comments, response to survey questionnaires, and similar activities designed and held to obtain comments from the general public and specific publics about National Forest System land management planning.

Purchaser Credit Credit earned by the purchaser of a National Forest timber sale by construction of contract specified roads. Earned purchaser credit may be used by the purchaser as payment for National Forest timber removed.

RARE II Roadless Area Review and Evaluation — A comprehensive process directed by Congress to identify roadless and undeveloped land areas in the National Forest System and to determine their uses for either wilderness or other resource management and development and areas that would require further study to make such a decision.

RPA The Forest and Rangeland Renewable Resources Planning Act of 1974. Also refers to the National assessment and recommended program developed to fulfill the requirements of the Act. The most recent recommended program was done in 1980.

RPA Assessment and Program The 1979 RPA Assessment describes the present forest and rangeland renewable resources situation and projects future supplies of, and demands for, these resources. The 1980 RPA recommended Forest Service program is based on findings of the assessment and recommends desirable resource goals in achieving program balance, a cost-effectiveness program and responsiveness to current and projected needs.

Real Dollar Value A value from which the effect of change in the purchasing power of the dollar has been removed.

Recreation Capacity The number of people that can take advantage of the supply of recreation opportunity at any one time without substantially diminishing the quality of the experience sought.

Recreation Visitor Day (RVD) One visitor day equals 12 hours (one person for 12 hours, or 12 people for 1 hour, or any combination thereof).

Reforestation The natural or artificial restocking of an area with forest trees; most commonly used in reference to the latter.

Regeneration The renewal of a tree crop, whether by natural or artificial means.

Regeneration Cut Any removal of trees intended to assist regeneration already present or to make regeneration possible.

Region For Regional planning purposes, the standard administrative Region of the Forest Service administered by the responsible official for preparing a Regional Plan; the area to be covered by a Regional Plan.

Regulations The Code of Federal Regulations for implementing the National Forest Management Act (36 CFR).

Regulated Timber Management Timber grown on those lands that will be or are organized on a sustained yield basis. A regulated forest involves the technical aspect of maintaining the commercial forest land on that basis. Normally, a conversion period is necessary to convert natural conditions to a relatively organized distribution of age and size classes so that sustained yield is achieved.

Standard Component. The portion of the regulated commercial forest land on which crops of industrial wood can be grown and harvested with adequate protection of forest resources under the usual provisions of the timber sale contract.

Marginal Component. The portion of the regulated commercial forest land on which it is presently not feasible (environmentally, economically or technologically) to manage for timber crops but on which it may be possible in the future.

Special Component. The portion of regulated commercial forest land that needs specially designed treatment of the timber resource to achieve landscape, water or other key resource objectives.

Reserved Forest Land Productive public forest land withdrawn from timber utilization through statute or administrative regulations.

Residual Stand The trees remaining standing after some form of selection cutting is performed on a stand.

Residue Loading The quantity of the unwanted accumulation in the forest of living or dead, mostly woody material that is added to and rearranged by man's activities such as forest harvest, cultural operations, and land clearing. Forest residue includes slash materials, excessive litter on the forest floor, unwanted living brush and weed trees, and standing dead trees and snags.

Residue Utilization Removal and use of forest residue (slash, litter, brush, dead trees and snags) for energy production, home heating or wood products.

Resource Use and Development Opportunities A possible action, measure, or treatment and corresponding goods and services identified and introduced during the scoping process which subsequently may be incorporated into and addressed by the land and resource management plan in terms of a management prescription.

Responsible Official The Forest Service employee who has been delegated the authority to carry out a specific planning action.

Retention A term used to define a degree of visual quality. A condition where in general, man's activities are not evident to the casual forest visitor.

Riparian Areas Geographically delineated areas, with distinctive resource values and characteristics that are comprised of aquatic and riparian ecosystems, floodplains, and wetlands. Generally 100-feet from water.

Roadless Area National forest lands, generally more than 5,000 acres, which do not contain roads and has been allocated to uses other than Wilderness by the RARE II process.

Rotation Age The total years required to establish and grow timber crops to specific condition of maturity.

S&PF State and Private Forestry Assistance Program.

Sanitation Salvage The removal of dead, damaged or susceptible trees, essentially to prevent the spread of pests or pathogens and so promote forest hygiene and salvage the mortality.

Saprophyte A plant living on dead or decaying organic matter.

Saturation Density (Same as tolerance density) Intraspecific tolerance permits no future increase. Is most marked in territorial species. Space is the limiting factor to further increase of this population density.

SCORP Statewide Comprehensive Outdoor Recreation Plan.

Second Growth Forest growth that has established itself naturally after some drastic interference (e.g., wholesale cutting, serious fire, or insect attack) with the previous forest growth.

Sensitive Species Those species which (1) have appeared in the Federal Register as proposals for classification and are under consideration for official listing as endangered or threatened species, (2) are on an official state list, or (3) are recognized by the Regional Forester to need special management in order to prevent the need for their placement on Federal or state lists.

Seral A biotic community which is a developmental, transitory stage in an ecologic succession.

Series A level of vegetation classification which is identified by the most common species found in the tree, shrub and/or herbaceous layer of a plant community. Series is a subdivision of a subformation.

Shade Tolerant Species that satisfactorily grow in the shade of other species. Those species unable to grow satisfactorily are called intolerant species while those able to grow in presence of shade are called tolerant species.

Shelter Trees Trees remaining after shelterwood cutting (see residual stand).

Short-Term Action governed by the management plan generally will take place within 5 years.

Silviculture The science and art of growing and tending forest crops by controlling the establishment, composition, distribution and representation of tree species, age and/or size classes.

Silvicultural System A combination of interrelated actions whereby forests are tended, harvested, and replaced. The combination of management practices used to manipulate the vegetation results in forests of distinctive form and character, and this determines the combination of multiple resource benefits that can be obtained. Systems are classified as even-aged and uneven-aged.

SIP State Implementation Plan. (Air Quality.)

Skyline Deflection The distance a skyline cable drops below line of sight during the yarding operation.

Skyline Logging A system of cable logging in which all or part of the weight of the logs is supported during yarding by a suspended cable.

Skyline Tailhold Anchors consisting of stumps, trees, deadmen or rock bolts to hold the end of the skyline yarding cable that is opposite the yarding machine.

Slash The residue left on the ground after timber cutting and/or accumulating there as a result of storm, fire or other damage. It includes unutilized logs, uprooted stumps, broken or uprooted stems, branches, twigs, leaves, bark and chips.

Small Game Birds and small mammals normally hunted or trapped.

Society of American Foresters (SAF) Forest and Cover Types A forest type is a descriptive term used to group tree stands of similar character as regards composition and development due to given ecological factors, by which they may be differentiated from other groups of stands. The term suggests repetition of the same character under similar conditions. A cover type is a forest type now occupying the ground, no implication being conveyed as to whether it is temporary or permanent.

Socio-Economic Pertaining to, or signifying the combination or interaction of social and economic factors.

SOMA (Spotted Owl Management Area) An area containing the home range of one or more owl pairs established for the propagation and protection of the species in accordance with Oregon Spotted Owl Management plan.

Stand An area of trees that has sufficient uniformity in species age and density to distinguish it from other stands around it.

Standard A principle requiring a specific level of attainment, a rule to measure against.

Stocking Density The degree of occupancy of land by trees, measured by basal area and/or number of trees by size and spacing, compared to a stocking standard; i.e., the basal area and/or number of trees required to fully utilize the growth potential of the land.

Subsistence Density A population obtaining enough food for bare survival, but not enough to maintain a healthy population over time. This population density should be regarded as a disaster level (Dasmann. Wildlife Biology:183).

Successional Stage A stage or recognizable condition of a plant community which occurs during its development from bare ground to climax; e.g. coniferous forests in the Blue Mountains progress through six recognized stages: grass-forb → shrub-seedling → pole-sapling → young → mature → old growth (Thomas, J., et.al. 1979).

Suitability The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.

Suppression All the work of extinguishing or confining a fire, beginning with its discovery.

Sustained-Yield of the Several Productions and Services The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest without impairment of the productivity of the land.

T&E Threatened and Endangered Species (See individual definitions).

TSI Timber Stand Improvement (See definition).

Thermal Cover Cover used by animals to lessen the effects of weather; for elk, a stand of coniferous trees 40 feet or more tall with an average crown closure of 70 percent or more.

Threatened Species Any species of animal or plant which is likely to become an endangered species within the foreseeable future throughout all or a portion of its range.

Timber Harvest Schedule The quantity of timber planned for sale and harvest by time period, from the area of land covered by the Forest Plan. The first period, usually a decade, of the selected harvest schedule provides the allowable sale quantity. Future periods are shown to establish that sustained yield will be achieved and maintained.

Timber Production The growing, tending, harvesting, and regeneration of regulated crops of industrial wood. Industrial wood includes logs, bolts, or other round sections cut from trees for industrial or consumer use, except fuelwood.

Timber Productivity See commercial forest land.

Timbershed A geographical grouping of forest lands that historically provide logs to a centralized area of use.

Timber Stand Improvement Measures such as thinning, pruning, release cutting, prescribed fire, girdling, weeding, or poisoning of unwanted trees aimed at improving growing conditions for the remaining trees.

Transportation Corridor A strip of land of variable width designated to accommodate the clearing and access control and visual resource limits of a highway or road facility, which may also be designated to accommodate one or more linear utilities.

USDA United States Department of Agriculture.

USDI United States Department of Interior.

Uneven-Aged Silviculture The combination of actions that result in the creation of forests in which trees of several or many ages may grow together. Managed uneven-aged forests may take several forms depending upon the particular cutting methods used. In some cases, the forest is essentially similar throughout, with individual trees of many ages and sizes growing in close association. In other cases, small groups of trees of similar age may be intermingled with similar groups of different ages; although the groups are even-aged, they are not recorded separately. Finally, an uneven-aged forest may contain two or three distinct age classes on the same area, creating a storied forest. Under uneven-age silviculture, regeneration is obtained several or many times during the period required to grow an individual tree to maturity. Single-tree selection cutting, and other forms of partial cutting are used to harvest trees, obtain regeneration, and provide appropriate intermediate culture. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Scheduling by area harvest is often used as well.

Individual Tree Selection Cutting Involves the removal of selected trees of all size classes on an individual basis.

Group Selection Cutting Involves the removal of selected trees of all size classes in groups of a fraction of an acre up to 2 or 3 acres in size.

Unproductive Forest Land Forest land of such low site quality that it is generally incapable of producing 20 cubic feet per acre per year of usable wood products.

Unregulated Timber Management Timber cut from those lands that are not organized to provide sustained yields of timber.

Urban Forestry The practice of forestry in an urbanized environment.

Utility Corridor A strip of land, up to approximately 600 feet in width, designated for the transportation of energy, commodities and communications, by railroad, State Highway, electric power transmission (66 KV and above), oil and gas and coal slurry pipelines 10 inches in diameter and larger, and telecommunication cable and electronic sites for interstate use. Transportation of minor amounts of power for short distance, such as short feeder lines from small power projects including geothermal or wind, or to serve customer subservice substations along the line, are not to be treated within the Forest Plan effort.

Utilization Standards Standards guiding the use and removal of timber. They are measured in terms of diameter at breast height (d.b.h.) and top of the tree inside the bark (top d.i.b.), and percent "soundness" of the wood.

Viable Population The number of individuals, adequately distributed throughout their range, necessary to perpetuate their existence in natural, genetically stable, self-sustaining populations.

Visual Quality Objective A desired level of excellence based on physical and sociological characteristics of an area. Refers to the degree of acceptable alteration of the characteristic landscape.

Visual Resource The composite of basic terrain, geologic features, water features, vegetative patterns, and land use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

Westside Forests The nine National Forests of the Pacific Northwest Region that lie west of the Cascade Mountain Range crest (Gifford Pinchot, Mt. Baker-Snoqualmie, Mt. Hood, Olympic, Rogue River, Siskiyou, Siuslaw, Umpqua and Willamette National Forests).

Wetlands Areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction (Executive Order 11990).

Wilderness Under the 1964 Wilderness Act, Wilderness is undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. It is protected and managed so as to preserve its natural conditions which 1) generally appear to have been affected primarily by the forces of nature with the imprint of man's activity substantially unnoticeable; 2) has outstanding

opportunities for solitude or a primitive and confined type of recreation; 3) has at least 5,000 acres or is of sufficient size to make practical its preservation, enjoyment, and use in an unimpaired condition; and 4) may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest.

Wildfire An unplanned fire requiring suppression action; fires burning uncontrolled in any surface vegetation fuels, such as grass, brush or forest.

Wildland Uncultivated land other than fallow. It may be neglected altogether or maintained for such purposes as wood or forage production, wildlife, recreation, or protective plant cover. Also, land virtually uninfluenced by human activity.

Windfall A tree thrown or the stem broken off or other parts (branches, foliage, fruit, etc.) blown down by the wind.

Yarding The moving of logs from the stump where cut to a central concentration area or landing.

Appendix B

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Region 6
P. O. Box 3623, Portland, Oregon 97208

REPLY TO: 4050 Research Programs
(2630)

April 1, 1981

SUBJECT: Research on Old-Growth Forests as Wildlife Habitat

TO: Chief



There is increasing public interest in "old-growth" forests and their management. Of particular concern is the question of the role of such forests as a specialized wildlife habitat. This affects Federal land management agencies in California, Oregon, Washington, and Alaska who control the vast majority of such stands.

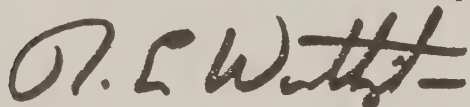
Two wildlife species are of immediate concern and controversy - the northern spotted owl in western Oregon and Washington, and in northern California; and the Sitka black-tailed deer in southeast Alaska. These species are becoming biological and political symbols of the animal community that some biologists suspect are dependent on "old-growth" habitat conditions. The northern spotted owl was the subject of a recent Oregon Wilderness Coalition appeal. Your decision on this appeal included a requirement that Region 6 provide an "evaluation of needed research" in the Regional Plan. We not only need more information on these two species but on the entire subject of wildlife/old-growth.

This controversy will probably intensify rapidly as old-growth is reduced by harvest. Planning for the old-growth forest resource is sensitive and controversial due to demands for maintenance and demands for harvest. This is complicated by the extremely high dollar value of old-growth.

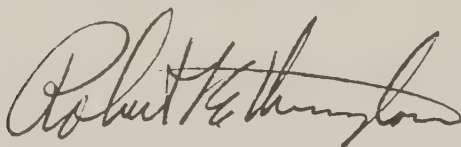
It is essential that this planning and decisionmaking be based on reliable data and an understanding of whatever "uniqueness" exists in old-growth stands. This need for knowledge is most acute where wildlife is concerned.

We strongly urge that Forest Service research efforts be intensified on old-growth as wildlife habitat.

Enclosed is a brief paper discussing research/administrative study needs on old-growth forests as wildlife habitat, with special reference to the northern spotted owl.



R. E. WORTHINGTON, Regional Forester
Pacific Northwest Region



ROBERT L. ETHINGTON, Station Director
Pacific Northwest Station

Enclosure

cc: PP&B

Research Needs - Wildlife and Old Growth

The northern spotted owl has a demonstrated affinity for overmature (old-growth) conifer stands containing Douglas-fir as a primary component. Spotted owl numbers have decreased along with the amount of old-growth stands to the point that the species is considered "sensitive" - that is, there is a distinct probability that the species could become endangered without appropriate management. Development of such management plans, which all involve maintenance, of numerous stands of old growth, has made it obvious that costs in terms of timber values foregone will be very high.

Information is needed to assure the best chance of success for the final Plan at the least cost in timber values foregone. The present state of knowledge is insufficient for these purposes and the consequences of such ignorance is apt to be high - either in terms of the spotted owl slipping to endangered status or in terms of constraints on management of old-growth stands that may be too stringent.

The issue of the spotted owl and maintenance of old growth is the present focus of attention. It is, in our opinion, only a symptom of a much larger and more complex issue. That is the question of old growth as a special or unique habitat for certain species of wildlife. It is well established that forests are divisible into plant communities which demonstrate consistencies in composition, successional process and structure. These forest communities proceed through a succession of recognizable states in the process of moving from bare ground to old growth. Combinations of plant communities and successional stages are two descriptors of habitat that are being used by the Forest Service in its national Fish and Wildlife Habitat Relationships Program. All of these successional states will be in plentiful supply in managed forests except old growth.

Old-growth forests are becoming more rare as they are harvested. This trend is anticipated to continue as these decadent, in the silvicultural sense, stands are cut and converted to younger, faster growing stands. It seems likely that the existence of such stands will become an increasingly key issue in the meeting of the "diversity" requirements of the National Forest Management Act and the regulations issued pursuant thereto.

In other words, the issue of old growth as a wildlife habitat is a much broader question than that of appropriate management of the spotted owl and its habitat. Research needs should be more broadly defined into three general areas.

- I. Describe (define) and classify old growth. The term "old growth" is poorly defined. This lack of definition is producing problems by making communication difficult.

- A. Describe old growth. Old growth must be examined and described. These descriptions should then be used to form the basis of classification.

B. Classify old growth. Classification is needed in order to give a rationale basis for inventory, research and management.

C. Inventory old growth. Inventory under the previously developed definitions and classification is essential to provide information on the amount, size and distribution of remaining old growth. Such data is essential for development of research plans and management alternatives.

II. Identify wildlife species that are dependent on or find optimum habitat in old growth.

A. Compare animal communities between old growth and the closest approximation of managed mature stands within each old-growth classification. These comparisons can be used to identify those species that occur only in old growth or find optimum habitat there.

B. Compare habitat attributes between old growth and the closest approximation of managed mature stands within each old-growth classification. These comparisons can be used to identify habitat attributes that may be important in later research or management. These identified attributes can also be used to sharpen definitions of stands that meet old-growth criteria.

C. Derive priorities for research on species identified as dependent on old growth or find optimum habitat in old growth. Obviously, those species that are most closely tied to old growth for habitat, require the largest territories and exist in lowest numbers are those most likely to be identified as "sensitive" and research should be directed to those species first. The information derived under II.A and II.B above will be used in setting these priorities.

III. Research is needed on individual species that are found only in old growth or find optimum habitat there. The research needed on each species may be quite different depending on the state-of-knowledge on that species. The first step after identification of the species (II.A) and setting a sufficiently high research priority (II.C) will be a detailed research problem analysis on that species. In that process, the information existing on the species will be summarized and a research program designed to provide needed information on and understanding on that species sufficient to devise an appropriate and well-founded management plan. Only one such species has been definitely identified - the northern spotted owl. The research needs for this species are listed below.

A. Northern spotted owl. This species has been identified as probably dependent on old growth, certainly as finding its optimum habitat in old growth. The species has been identified by the Forest Service as "sensitive" and plans are being derived for its management.

1. Population ecology.

a. Dispersal. Estimates of a "viable" population are based on population-genetic theory. Conclusions depend, in part, on rates of gene flow throughout the spotted owl's range. In turn, this requires knowledge of dispersal rates and distances by sex and age category. At least 30 birds (adults and young) with radio transmitters attached should be studied. These studies should be spread across the owl's range.

b. Reproduction rates. Such information is required to construct realistic models of population dynamics. These models are essential to help evaluate different management schemes and population sizes.

c. Age at breeding. Needed for construction of population dynamics models.

d. Longevity. Needed for construction of population dynamics models.

e. Territoriality. Needed for construction of population dynamics models and to determine potential population densities.

2. Spotted owl status. It is essential to know the current status and location of pairs of spotted owls. In no other way can the success of a spotted owl management plan be judged. Disconnected and uncoordinated efforts are expensive. Appropriate techniques exist. Coordination of such efforts is essential.

3. Habitat requirements.

a. Size. It is critical to be able to define the sizes of old-growth habitats required to support a pair of nesting owls. If a spotted owl management area is too small it will not serve its function. If it is too large the costs, in terms of wood products foregone, is increased dramatically.

b. Description. It is essential to identify the characteristics of the habitat that make it uniquely satisfactory to spotted owls. Such information is essential to enhance chances of success in creating habitat or selecting old-growth stands for retention.

c. Effects of habitat alteration. Owl response to habitat alteration must be determined in order to define the degree of flexibility that silviculturists have in creating or manipulating habitats. If a given manipulation destroys the usefulness of the habitat that, perhaps critical, block is lost and the overall spotted owl management effort is closer to failure. Conversely, absence of flexibility will be expensive in terms of wood production foregone.

4. Genetic variability. The genetic variability of the population needs to be checked periodically to insure that gene flow throughout the population is satisfactory. This is a way to assure that the population size is large enough, that habitats are satisfactorily distributed, and that isolated populations are identified.

5. Competition with other species. In the case of "sensitive" or threatened or endangered species all limiting factors must be evaluated and considered for management application. This is one such factor. One potential competitor has been identified-the barred owl. The kind and degree of competition should be determined. If the competition with limited habitats is severe the viability of control of competing species should be evaluated.

6. Predation by other species. Losses of spotted owls to predators should be evaluated and primary predators identified. If such losses are significant the feasibility of predator control within spotted owl management areas should be evaluated.

IV. Highest priority for research efforts.

A. Item III.A.1.a. on dispersal. These studies would also provide information on home range size, nest site locations, breeding success, clutch size, etc.

B. Item III.A.3. on habitat requirements.

V. Identification of research needs as suitable for research or administrative studies. Administrative studies are carried out by management personnel to provide information needed by management. If the research is of a complex or detailed nature it is more appropriately carried out by personnel trained and experienced in research.

A. Best suited to administrative studies.

1. Description and classification of old growth.

2. Description and monitoring status of the spotted owl.

B. Best suited to research. All other items described in the preceding outline are best addressed by research personnel.

VI. Funding of research.

A. Administrative studies. Such studies are funded by the management agency (USFS or BLM) and use, usually, appropriately trained management personnel.

B. Research.

1. Funding through USFS Research. Such funding does not now exist. If this avenue is used additional funds must be acquired.
2. Funding through BLM. BLM can finance such research.
3. Funding through USF&WS. Possible.
4. State agency contribution. Possible.

Appendix C



United States
Department of
Agriculture

Forest
Service

RO

Reply to:

2670 Threatened and Endangered Plants and Animals

Date: April 20, 1981

Subject:

Spotted Owl Management - Washington Forests

To:

Forest Supervisors, Gifford Pinchot, Mt. Baker-Snoqualmie,
Olympic, Wenatchee NF's

Your interim (tentative) allocation of spotted owl pairs for which you will manage habitat until your Forest Plan is approved is:

Gifford Pinchot	32
Mt. Baker-Snoqualmie	49
Olympic	17
Wenatchee	14

Other direction sent to you October 28, 1980, (1570/2670) still applies.

James F. Worthington
for R. E. WORTHINGTON
Regional Forester



UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Region 6

P. O. Box 3623, Portland, Oregon 97208

REPLY TO: 1570 Appeals
2670 Threatened and Endangered Plants and Animals

October 28, 1980

SUBJECT: Spotted Owl Management - Washington Forests

TO: Forest Supervisors, Gifford Pinchot, Mt. Baker-Snoqualmie,
Olympic, Wenatchee NF's



We are now in receipt of the Chief's decision regarding an appeal brought against the Region 6 Spotted Owl Management Guidelines. Although the appeal response was directed to the Oregon Forests which have implemented the plan, the planning process which is identified applies Region-wide. This is to clarify direction for spotted owl management interim to Regional and Forest Plan completion.

As a part of the development of the Regional Plan, a new determination will be made of what constitutes a viable population of spotted owls in Region 6. This will be based on an analysis of the current level of information. The Regional Plan will then assign viability numbers, or viability ranges, for Forests to consider as they prepare their Forest Plans.

We expect to complete a preliminary analysis of these viability numbers in November. At that time, a tentative allocation of numbers will be made to Washington Forests which have owls, pending completion of the Regional Plan. These may be updated by numbers provided in the DEIS for the Regional Plan (expected to be available February 15, 1981). Final numbers will be included in the final Regional Plan (expected in August of 1981).

As of the date of receipt of this letter, all confirmed owl pairs under your current inventory will receive protection in accordance with the current Region 6 Spotted Owl Guidelines, which include a 300-acre protection core. Timber sales already advertised are exempted.

Protection for your tentative allocation of owls will be met by July 1, 1981, through either of the following ways:

1. Delineation of SOMAs which have been confirmed to have owl pairs, in accordance with the attached R-6 standards.
2. A combination of confirmed SOMAs and delineated suitable habitat which still needs to be confirmed.

After July 1, 1981, all known or newly-discovered owl pairs will be protected until your tentative allocation can be met by means of condition 1, above.


Protection will be in accordance with Region 6 Spotted Owl Guidelines. The Oregon-Washington Interagency Wildlife Committee is revising these guidelines; the new version will be sent to you upon adoption by the Region. You should use the current version in the meantime.

Amendments to EA's will be made, as necessary, to insure the required protection. We are seeking approval of a timber contract protective clause for "sensitive species" to assist you in responding to this direction.

Under item 1, above, once your tentative allocation has been confirmed, you are not required to protect habitat for owl pairs in excess of that number. However, since your tentative allocation may be revised as the Regional Plan is completed, you should not forego your options to protect owl pairs in excess of the tentative allocation, if it will not impact other programs to do so.

The ultimate result must be that we maintain a viable population of spotted owls, over time, such that we prevent the need for Federal listing.

Contact the Fish and Wildlife Unit if you need to discuss approaches to meet this direction.


for R. E. WORTHINGTON
Regional Forester

Enclosure

cc: Jerry McIlwain, WO
Gary Heath, PP&B
Bob Simmons, OGC
Forest Supervisors

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Region 6

P. O. Box 3623, Portland, Oregon 97208

1570 Appeals

REPLY TO: 2670 Threatened and Endangered Plants and Animals September 19, 1980

SUBJECT: Spotted Owl Management - Implementation of Chief's
Direction

TO: Forest Supervisors, Deschutes, Mt. Hood, Rogue River,
Siskiyou, Siuslaw, Umpqua, Willamette, Winema NF's



This is to provide clarification regarding the Chief's decision on an appeal brought against the Region 6 Spotted Owl Management Guidelines, which you have now received.

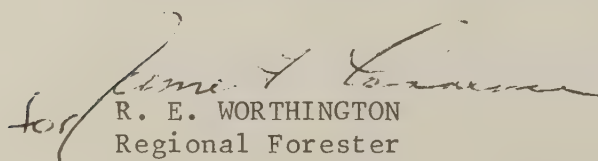
Interim to the approval of the Regional Plan, you are required to manage habitat for your present allocation of owl pairs.

In addition, you are to protect all known or newly discovered owl pairs until your allocation is confirmed. Timber sales sold by October 1, 1980, are exempt. Standards for verifying Spotted Owl Management Areas (SOMAs) and core areas are attached. We are seeking approval from the Chief to implement a timber contract protective clause for a "sensitive species" to enable us to meet this requirement in our FY 81 sales.

To meet the Chief's direction, you are not required to protect owl habitat above the present allocation, once that number has been confirmed. However, the Regional Plan will reassess the question of viability of spotted owls in Region 6 and consider alternative levels of management. You should not forego your options to manage for owl population levels in your Forest Plan other than your tentative allocation in response to public involvement in the Regional Plan E.I.S.

The ultimate result must be that we maintain a viable population of spotted owls, over time, such that we prevent the need for federal listing as threatened or endangered.

Contact the Fish and Wildlife Unit if you need to discuss approaches to meet this direction.


R. E. WORTHINGTON
Regional Forester

Enclosure

cc: Forest Supervisors

OREGON INTERAGENCY SPOTTED OWL MANAGEMENT PLAN

Objective: To maintain a population of at least 400 breeding pairs of northern spotted owls distributed throughout the known range in Oregon.

1. Maintain habitat to support spotted owl population objective.
 11. Develop spotted owl management area (SOMA) program.
 111. Establish management area parameters.
 1111. Size: a minimum of 1200 contiguous acres per pair (i.e. one home range).
 1112. Description of habitat: for each pair there should be a core area of at least 300 acres of old-growth forest maintained to benefit the owls. If 300 acres of old-growth does not exist, then maintain all remaining old-growth and enough of the oldest contiguous or closely adjacent second growth to total at least 300 acres. The remainder of the habitat is to be managed to provide at least 50% of the acreage in stands of 30-plus year forest. Old-growth forest must be at least 200 years old and contain an average of 8-10 old-growth overstory trees (a minimum of four) per acre, with a developed understory greater than 30 years of age.
 1113. Number of pairs: the SOMA should encompass the home ranges of a minimum of three to six pairs. Single pair SOMA's are acceptable to improve distribution or where remanent habitat exists.
 1114. Proximity of pairs: core areas for each pair should be seperated by approximately 1-3 miles.
 1115. Distribution throughout known range.
 11151. As a goal, SOMA's of 3 or more pairs should be 8-12 miles apart and single pair SOMA's 5-8 miles apart.
 11152. If occupied habitat isn't currently available to meet distributional goals, attempt to manage for it.
 112. Determine location of SOMA's.
 1121. Inventory statewide historical range for occupied spotted owl habitat.

1122. Recommend minimum nesting pair quota to each agency or landowner.

11221. U.S. Forest Service -290 pairs

11222. Bureau of Land Management - 90 pairs

11223. Other lands * - 20 pairs

* Other includes but is not limited to state (i.e. Forestry, Fish and Wildlife, Parks), county, national park and private lands.

1123. SOMA's can be relocated in the future if such a change benefits the species. The new SOMA must meet the criteria of 111.

12. Develop a management strategy for occupied habitat not included in SOMA's or which is located in the future.

121. It is recommended that spotted owl nest sites that are not included in SOMA's be protected with at least a 5 - chain buffer around the known or suspected nest tree or managed in accordance with agencies policy for raptor nesting habitat.

122. Before modifying the site, consideration should be given to: 1) the need to improve the distribution of older forest ecosystems for all associated plant and animal species; 2) providing insight into management of SOMA's through experimental habitat manipulation.

13. Implement management programs and strategies identified in 11. and 12.

14. Monitor SOMA populations.

2. Develop habitat management alternatives for the spotted owl.

21. Refine knowledge of spotted owl habitat.

211. Determine survival, productivity and recruitment in second growth.

212. Examine habitat utilization in second growth areas.

213. Continue surveys for spotted owls in potential habitat (i.e. old-growth forests).

22. Develop silvicultural practices compatible with maintaining spotted owl populations.

221. Monitor effect of experimental habitat manipulation on spotted owl populations.

2211. Determine survival rate.

- 2212. Determine productivity.
- 2213. Determine relationship to prey base.
- 2214. Evaluate potential of nest boxes, platforms and artificial cavities in second growth.
- 2215. Examine dispersal/interchange of owls between management areas.
- 222. Analyze results of 221 and provide management recommendations.
- 3. Management program administration.
 - 31. Establish coordinator position.
 - 32. Coordinate implementation of management and research program.
 - 33. Information and education.
 - 331. Keep agencies and cooperators informed.
 - 332. Keep public informed.
 - 333. Coordinate program with Washington, California and British Columbia.
 - 34. Review status of management plan at least annually.

Revised 5/79

CB:mcd

5/15/79

Table C1 — Summary of Spotted Owl Interim
Management Levels
Pacific Northwest Region

Oregon	Pairs¹
Deschutes	10
Mt. Hood	35
Rogue River	35
Siskiyou	32
Siuslaw	22
Umpqua	40
Willamette	100
Winema	16
	<hr/> 290
Washington	Pairs²
G. Pinchot	32
Mt. B.-Snoq.	49
Olympic	17
Wenatchee	14
	<hr/> 112

¹ Pair density recommended in the revised 1979 Oregon Spotted Owl Management Plan (Appendix C).

² Pair density represents the estimated, minimum viable population (Appendices D and E).

Appendix D

Procedure Used for Determining Minimum Viable Populations and Maximum Biological Potentials for the Spotted Owls in the Pacific Northwest Region

Viable Populations

For purposes of the following discussion, a viable population is defined as the number of individuals, adequately distributed throughout their range, sufficient to perpetuate their existence in natural, self-sustaining populations. Viability is a range of population levels, controlled at the lower end (minimum viable level) principally by numbers of individuals, and at the upper end (maximum biological potential) by availability of suitable habitat.

Natural population levels are a reflection of a complicated interaction of many regulatory factors. Those factors considered in determining minimum viable levels and maximum biological potentials for spotted owls, along with a set of four assumptions, are discussed below:

Regulatory Factors

- **Population Density:** Population levels below a viable density, are more prone to local, if not widespread geographic extinction, with changes in environmental conditions than are populations at optimum densities or carrying capacities.
- **Natality Rate:** For many species, there appears to be a population density below which the species fail to reproduce and to recover its total population numbers. When a population falls below this "point of resistance," it loses its ability to recover.
- **Dispersion Potential:** Species differ in their ability to move and colonize new suitable habitats. Dispersal is important to any given species in order to colonize vacant habitat, prevent overcrowding, promote gene flow, and protect populations from fatal disease outbreaks.
- **Territorialism:** Some species, such as the spotted owl, regulate their density by aggressive defense of nesting territories. Therefore, otherwise suitable habitat will not be occupied if it is within the defensive area of an established pair of birds.
- **Habitat Suitability:** Habitat quality and quantity directly influence population densities, mortality rates, dispersion potential, reproductive success, competition, and other factors.

- **Species Adaptability:** Species exhibit great differences in their ability to adapt to different habitat and habitat conditions. Animals which accept and do well in a variety of habitat types and conditions within types, pose few management problems. Conversely, species such as the spotted owl, which have more restrictive habitat requirements, are more vulnerable to changes.

Assumptions

- a. Oregon Endangered Species Task Force (OESTF) (now Spotted Owl Subcommittee of the Oregon-Washington Interagency Wildlife Committee) recommendations on spotted owl numbers and distributional patterns for single and multiple pair Spotted Owl Management Areas (SOMAs) simulate owl numbers and distributional patterns as they occur in nature.

Rationale: OESTF recommendations are based in part on research by Eric Forsman (1975).

- b. All old growth displayed on base maps (currently filed in Fish and Wildlife Staff Unit, Pacific Northwest Region, Forest Service) is suitable spotted owl habitat, as described in the revised 1979 Spotted Owl Management Plan.

Rationale: The Chief, in his direction to determine viability for the spotted owl, specified that existing data be used. Existing data is that displayed on the base maps as developed by individual National Forests involved. Old growth, as displayed, does, in a general way, meet the description given in the SOMP. Validation of individual SOMAs will compensate for any discrepancy in this assumption.

- c. There will never be more old growth (spotted owl habitat) than exists today.

Rationale: The demand for wood products will result in the continued reduction of old growth on lands managed for timber production. The time it takes to grow "old growth" and the demand for sawlogs will prevent it from occurring in amounts greater than exist today.

- d. For purposes of maintaining the genetic integrity of the spotted owl in Oregon, Washington, northern California, and southern British Columbia, it is assumed no distribution barrier between the Olympic Peninsula and the Cascade populations occurs at this time. Also, it is assumed that the Columbia River between Oregon and Washington is not a barrier to maintaining genetic integrity.

Procedure Used

Area Included:

Twelve of the Regions' 19 National Forests support spotted owl populations and were included in the population determinations: For Washington, these are the Gifford Pinchot, Mt. Baker-Snoqualmie, Olympic, and Wenatchee National Forests. Oregon National Forests are the Deschutes, Mt. Hood, Rogue River, Siskiyou, Siuslaw, Umpqua, Willamette, and Winema.

National Forest habitat makes up only part of the total spotted owl range. Other major land ownerships within the spotted owl range include public lands [Bureau of Land Management (BLM), National Park Service (NPS), State Department of Forestry in Oregon, and State Department of Natural Resources in Washington], and private timber industry holdings. Of this group, only the Bureau of Land Management and National Park Service are committed to providing habitat for spotted owls. Both the Bureau of Land Management and National Park Service are members of the spotted owl subcommittee of the Oregon-Washington Interagency Wildlife Committee. Numbers and distribution as provided by the Forest Service, BLM and NPS have been coordinated through the subcommittee.

Delineating Old Growth:

Each National Forest with the exception of the Willamette (see Appendix C) submitted maps displaying existing old-growth timber in stands greater than 300 acres and below 4,000-foot elevation. The Oregon Spotted Owl Management Plan (see Appendix E) recommends a core area of at least 300 acres around the nest site. Owl surveys in Washington and Oregon support an upper elevational limit of 4,000 feet. A few owls have been found above 4,000 feet, but habitat above that level is generally considered marginal.

Calculating Numbers and Displaying Distribution:

All National Forest old-growth maps were converted to one-quarter-inch-to-the-mile base maps for Washington and Oregon. Mathematically proportioned templates were then constructed and used to plot potential owl populations consistent with: (1) available old growth; (2) distribution and density patterns defined for the minimum viable and maximum biological potential population levels.

An additional step was taken in calculating the minimum viable population. Because of troublesome distribution patterns, there was in some cases, heavy reliance on single pair spotted owl management areas (SOMAs). It was opined by biologists on the spotted owl subcommittee that a significant number (perhaps 75 percent or more) of the single pairs would not be

viable over time. Therefore, the total number of pairs was increased to offset this predicted failure. The increase was accomplished by adding to the population a number equivalent to 75 percent of the single pair areas mapped. For example, if a Forest had 3 single pair (SOMAs) and 15 pairs in groups of 2 or more the following treatment was applied:

$3 \text{ single pairs} \times 75\% = 2 \text{ additional single pairs.}$
 $2 \text{ additional single pairs} + 3 \text{ single pairs} + 15 \text{ grouped pairs} = 20 \text{ total pairs for the Forest.}$

Results

Maximum Biological Potential

This population level estimates the number of pairs of spotted owls that could exist if all the present spotted owl habitat were occupied.

Although unrealistic and probably impossible to achieve, it gives the high end of the viability scale in accordance with the Oregon Spotted Owl Management Plan. The following criteria were used to determine maximization.

- Core area per pair — 300 acres of old growth.
- Core areas 2 miles apart, measured from edge of core to edge of core.
- Three pairs per SOMA (where possible).
- Maximum number of core areas per SOMA.
- Two miles between SOMAs.

Table D1 — Maximum Biological Potential

National Forests	Number of Pairs
Oregon	
Deschutes	33
Mt. Hood	116
Rogue River	36
Siskiyou	176
Siuslaw	46
Umpqua	173
Willamette*	227
Winema	17
Total	824
Washington	
Olympic	109
Gifford Pinchot	165
Mt. Baker-Snoqualmie	229
Wenatchee	38
Total	541
Region	Total 1,365

* See Appendix E.

Minimum Viable Population Level:

The following criteria were used in developing the minimum viable populations for each Forest, as exhibited in Table B-2.

- Core area per pair — 300 acres of old growth.
- Core areas 2 miles apart, measured from edge of core to edge of core.
- Three pairs per SOMA (where possible).
- SOMAs 12 miles apart, measured from edge of outermost core to edge of outermost core.
- Single pair SOMAs increased by 75%.

Table D2 — Minimum Viable Population Calculations

National Forests	No. Single-Pair SOMAs	75% of Single-Pair SOMAs	No. Pairs with 2 or 3 pairs per SOMA	Minimum Viable Population
Oregon				
Deschutes	2	2	14	18
Mt. Hood	4	3	23	30
Rogue River	4	3	7	14
Siskiyou	2	2	27	31
Siuslaw	5	4	18	27
Umpqua	2	2	34	38
Willamette	29	22	47	98
Winema	2	2	3	7
			Total	263
Washington				
G. Pinchot	1	1	30	32
Mt. B.-Snoq.	3	2	44	49
Olympic	0	0	17	17
Wenatchee	7	5	2	14
			Total	112
Regional			Total	375

Proposed Action and Rationale:

As pointed out in the viable population discussion, a minimum viable population is not a desirable or practical density level at which to manage any wildlife population.

Through consultation with Dr. Soule (Soule, M. 1980) and others, it is believed that genetic integrity, i.e., maintenance of heterozygosity and avoidance of inbreeding depression, can be maintained within the gene pool of 1,000 adult breeding birds (500 pair). The critical issue is in the maintenance of a distributional pattern which will insure an intermixing of the total population throughout its range.

Obviously, weak links in the management "chain" are single-pair SOMAs and/or multi-pair (> 3 pairs) SOMAs in poor habitat. This discussion brings into focus several criteria to test against when developing a recommended alternative to manage spotted owl populations over time.

Criteria to test against:

- A population must have 500 breeding pairs (1,000 adult individuals) to maintain genetic integrity over time. 500 pairs is not an objective, but a test against the objective of managing for a viable population.
- The importance of providing for a suitable distributional pattern throughout the bird's range becomes paramount. Suitable distribution is defined in the Oregon Spotted Owl Management Plan, revised 1981. If distribution is not maintained, requirements for managing viable populations become more stringent, (i.e., requiring more breeding birds and more intensive management) which would need to be applied to isolated populations instead of a regional population.
- National Forest lands are critical for maintaining a suitable population density and distribution of spotted owls and habitat on the westside of the Cascades.

It is important to point out that the proposed action and the minimum viable population were not developed through calculations entirely based on scientific data. In some cases, it represents the best expert opinion from biologists and other managers in relation to considering the above mentioned criteria plus issues and scientific data discussed in the many meetings and materials reviewed (see bibliography).

To meet the intent and direction set forth by Forest Service Policy, and the Chief of the Forest Service (i.e., August 1980 decision regarding the Oregon Wilderness Coalition's appeal pursuant to 36 CFR 211.19), the management of 30 percent above the minimum viable population is a safe approach. It is hypothesized this management plus the inter-mixing of owl pairs from other land bases (i.e., National Park Service and Bureau of Land Management) prudently managed in accordance with the revised 1981 Oregon SOMP, will provide for a self-sustaining population of spotted owls throughout its present range. For comparison of the proposed action to other population densities in relation to the risk of losing viability, refer to Tables B-3 and B-4.

Table D3 – Spotted Owl Population Levels (In Pairs)

Oregon NFs	290 ¹	263	340	824
Washington NFs	-0- ²	112	146	541
Regional	290	375	486	1365

High Low
Risk of Losing Regional Viability

¹ Oregon Endangered Species Task Force, 1977 recommended allocation of pairs to NFS in Oregon. Oregon Interagency Spotted Owl Management Plan as revised 1981.

² Washington National Forests had no assigned spotted owl population level prior to preparation of this plan.

Table D4 – Comparison of Spotted Owl Population Levels and Distribution to National Forests

	Maximum Biological Potential Pair	Minimum Viable Pop. Level Pairs	Minimum Viable Pop. Plus 30% Level Pairs
Oregon			
Deschutes	33	18	23
Mt. Hood	116	30	39
Rogue River	36	14	18
Siskiyou	176	31	40
Siuslaw	46	27	35
Umpqua	173	38	49
Willamette	227	98	127
Winema	17	7	9
	<hr/> 824	<hr/> 263	<hr/> 340
Washington			
Olympia	109	17	22
Gifford Pinchot	165	32	42
Mt. Baker-Snoq.	229	49	64
Wenatchee	38	14	18
	<hr/> 541	<hr/> 112	<hr/> 146
Regional	1,365	375	486

Appendix E

Procedure for Calculation of Minimum Viable Population and Maximum Biological Potential Spotted Owl Population Levels for the Willamette National Forest

Due to the lack of old-growth information, owl numbers for the Willamette N.F. were derived by the following:

Minimum Viable Level

Step 1

The latest (revised January 26, 1981) spotted owl inventory map, depicting mapped locations (predominately vocal responses) were displayed. A mathematically proportioned template depicting the minimum, three-pair SOMAs (core areas two miles apart — from potential nest site to potential nest site) stretched 12 miles apart was developed. The template was then overlaid on the inventory map.

Working from the northernmost boundary of the Willamette N.F. south, the template was positioned so as to enclose as many inventoried spotted owl sightings as possible into the theoretical three-pair SOMAs and, at the same time, maintain the minimum distributional spacing (i.e., 12 miles) between theoretical multi-pair SOMAs, per the revised 1979 Oregon SOMP.

Step 2

The January 26, 1981, inventory map had proposed SOMAs delineated. The assumption was made that at least a majority of each delineated area (SOMA) was old growth and suitable habitat for spotted owl management.

Based upon the size (estimated acres) of each proposed SOMA plus number and position of marked responses (spotted owl sightings), biologists simulated whether the selected SOMAs, in accordance with the 1979 Oregon SOMP, were single-pair SOMAs or multi-pair SOMAs.

Based on this procedure, it was estimated that the Willamette would require 21 multi-pair SOMAs (47 pairs) and 29 single-pair SOMAs to meet distributional needs of maintaining spotted owls on that National Forest.

Maximum Biological Potential Level

The combined acres of old growth Douglas-fir in the Regional Plan data base for the Mt. Hood and Umpqua National Forests were divided by their combined maximum potential owl population. This gave a ratio of spotted owls to old growth. The ratio value was then divided into the Regional Plan data base old-growth inventory for the Willamette National Forest. The resulting figure became the estimated biological potential population for the Willamette National Forest. The reason for using the Mt. Hood and Umpqua National Forests was that these Forests bracket the Willamette to the north and south.

The National Forest Population Level for the National Forest Population Level for the National Forest

The National Forest
 Population Level for
 the National Forest

Potential Level

The National Forest
 Population Level for
 the National Forest

The National Forest
 Population Level for
 the National Forest

The National Forest
 Population Level for
 the National Forest

The National Forest
 Population Level for
 the National Forest

The National Forest
 Population Level for
 the National Forest

Potential Level

The National Forest
 Population Level for
 the National Forest

The National Forest
 Population Level for
 the National Forest

The National Forest
 Population Level for
 the National Forest

Appendix F

Date: March 6, 1981

To: Regional Forester, Pacific Northwest Region, Forest Service
Oregon State Director, Bureau of Land Management
State Forester, Oregon Department of Forestry

On November 3, 1977, as chairman of the Endangered Species Task Force, I submitted for your review and approval, a "Spotted Owl Management Plan" for Oregon.

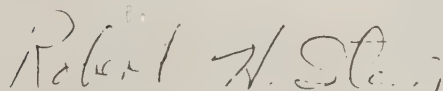
One item in the Plan is to "Refine knowledge of spotted owl habitat." Considerable information pertaining to owl habitat has been gained since 1977. Based on new findings, members of the Oregon-Washington Interagency Wildlife Committee have concurred that proposing a change in the Oregon Plan is appropriate.

Our proposed changes are based, primarily, on studies reported by Eric Forsman. In studies of 14 adult spotted owls conducted since 1975, Forsman demonstrates a home range size variation from 1,356 to 8,352 acres. The minimum old growth forest within a home range is 740 acres. Forsman's "Summary of Radiotelemetry Studies Conducted on Spotted Owls in Western Oregon," dated February 4, 1981 is enclosed.

Our committee is fully aware that timber harvest will be influenced by the recommended increase in the total acres of "old growth" trees to be managed in order to maintain spotted owls at a viable population level. We are aware, also, that additional studies are needed to verify more clearly the habitat requirements for spotted owls. We are convinced, however, that information gained since the original "Spotted Owl Management Plan" for Oregon was written justifies the following recommendation for your consideration:

Habitat conditions contained in the enclosed "Proposed Revision of the Oregon Interagency Spotted Owl Management Plan," dated February 26, 1981, be considered in the planning of timber management on lands under your administration--with the proviso that during the next five-year period (1) 300 acres of old growth forest be maintained for each pair of spotted owls, (2) the forests be managed so that the option to provide 1,000 acres of old growth per pair within a radius of 1.5 miles of nest sites is maintained, (3) a study plan be prepared and executed to identify more clearly the habitat requirements of the owls, and (4) the "Oregon Spotted Owl Plan" be revised at the end of the 5-year period to reflect the knowledge gained from the studies.

We will appreciate your response to this proposal.



R. H. STEIN, Chairman
Oregon-Washington Interagency
Wildlife Committee

PROPOSED REVISION OF THE
OREGON INTERAGENCY SPOTTED OWL MANAGEMENT PLAN*

Objective: To maintain a population of at least 400 breeding pairs of northern spotted owls distributed throughout the species' range in Oregon.

1. Maintain habitat to support spotted owl population objective.

11. Develop spotted owl management area (SOMA) program.

111. Establish management area (SOMAs) parameters.

1111. Habitat Characteristics

On each site managed for a pair of owls, maintain an old growth core area of at least 300 acres around the nest and an additional 700 acres of old growth within a 1.5 mile radius of the nest. If 1,000 acres of old growth does not exist within a 1.5 mile radius of the nest, then substitute the oldest stands available and manage them in the same manner as old growth.

Old growth stand characteristics will vary from site to site, but objectives should be to maintain dense multi-layered stands on which overstory trees are at least 250 years old, and understory trees range in age from saplings to 200 years old, i.e., uneven aged understory. The salvage of down or dead material should not be conducted in old growth stands managed for spotted owls. Stands intended as replacements for existing old growth stands should be managed to duplicate conditions on natural old growth stands already present in the area.

1112. Number of pairs: the SOMA should encompass the home ranges of at least three pairs. Single pair SOMA's are acceptable only to improve distribution or where remnant habitat exists.

1113. Proximity of pairs: core areas for each pair should be separated by approximately 1-3 miles.

1114. Distribution

11141. As a goal, SOMA's of 3 or more pairs should be less than 12 miles apart and core areas of single pair SOMA's should be less than 6 miles apart.

11142. Maintain pairs of spotted owls uniformly distributed throughout the historic range. Attempt to recreate suitable habitat where spotted owls have been eliminated from portions of their range.

*The attached letter transmitting this Plan to the Forest Service Regional Forester, Pacific Northwest Region; Bureau of Land Management State Director; and Oregon State Forester is considered part of the Plan.

112. Determine location of SOMA's.
 1121. Inventory statewide historical range for occupied spotted owl habitat.
 1122. Recommend minimum nesting pair quota to each agency or landowner.
 11221. U.S. Forest Service - 290 pairs
 11222. Bureau of Land Management - 90 pairs
 11223. Other lands* - 20 pairs

*Other includes but is not limited to state (i.e., Forestry, Fish and Wildlife, Parks), county, national park, and private lands.
 1123. SOMA's can be relocated in the future if such a change benefits the species. The new SOMA must meet the criteria of 111.
12. Develop a management strategy for occupied habitat not included in SOMA's or which is located in the future.
 121. Before modifying the site, consideration should be given to:
 - 1) the need to improve the distribution of older forest ecosystems for all associated plant and animal species;
 - 2) providing insight into management of SOMA's through experimental habitat manipulation.
13. Implement management programs and strategies identified in 11 and 12.
14. Monitor SOMA populations.
2. Develop habitat management alternatives for the spotted owl.
 21. Refine knowledge of spotted owl habitat.
 211. Determine survival, productivity, and recruitment in second growth.
 212. Examine habitat utilization in second growth areas.
 213. Continue surveys for spotted owls in potential habitat (i.e., old growth forests).
 22. Develop silvicultural practices compatible with maintaining spotted owl populations.
 221. Monitor effect of experimental habitat manipulation on spotted owl populations.
 2211. Determine survival rate.
 2212. Determine productivity

- 2213. Determine relationship to prey base.
- 2214. Evaluate potential of nest boxes, platforms, and artificial cavities in second growth.
- 2215. Examine dispersal/interchange of owls between management areas.
- 222. Analyze results of 221 and provide management recommendations.
- 3. Management program administration.
 - 31. Establish coordinator position.
 - 32. Coordinate implementation of management and research program.
 - 33. Information and education.
 - 331. Keep agencies and cooperators informed.
 - 332. Keep public informed.
 - 333. Coordinate program with Washington, California, and British Columbia.
 - 34. Review status of management plan at least annually.

Draft Revision: February 26, 1981

Appendix G Discussion of the Silvicultural System Criteria

Silvicultural Systems: The even-aged silvicultural system will be the most commonly used system in coniferous forests of the Pacific Northwest Region. The uneven-aged silvicultural system may be used when healthy, fully stocked, uneven-aged stands exist or can be created by identified treatments within a defined time period. The selection of the appropriate silvicultural system will be guided by criteria (a) through (f) and the current land allocation.

Following is a discussion of each criteria used to determine the preferred silvicultural system. The indication of the commonly used regeneration harvest method in the following does not imply that other regeneration harvest methods would be unacceptable where local circumstances or land allocations dictate otherwise.

Criteria a. The selected silvicultural systems must permit the production of sufficient volume of marketable trees to permit utilization of all trees which meet utilization standards and are designated for harvest.

Discussion:

The timber stand which develops from the use of a selected silvicultural system must be capable of (1) producing sufficient volume of marketable trees to be harvested at intermediate cuts for a positive economic operation and (2) permit harvest of all trees, which meet utilization standards not required in the residual stand to provide desired stand structure and density at each commercial harvest operation.

Criteria b. The selected silvicultural system must permit the use of an available and acceptable logging method that has the capability to remove logs and other products without excessive damage to the identified desirable residual vegetation.

Discussion:

The following displays logging systems compatability consideration.

Compatibility of Logging Systems With Commonly Used Silvicultural Systems and Regeneration Harvest Methods in Pacific Northwest Region

		Commonly Used Silvicultural Systems and Regeneration Harvest Methods				
		Even-aged Mgt.			Uneven-aged Mgt.	
Logging system ¹	Normal operating constraints	Clearcut	Seed Tree	Shelter-wood	Group Selection	Single Tree Selection
Rubber tired Skidder	Stable soil not subject to compaction damage, downhill < 30%, uphill < 10%	A ²	A	A	A	A
Hard tracked crawler tractor	Stable soil not subject to compaction damage, < 30% downhill, < 10% uphill	A	A	A	A	A
Horse	Stable soil, downhill only < 30%	N ²	N	N	N	A
Highlead	Stable soil without convex topography up to 1200' slope dist. uphill, up to 600' slope dist. downhill	A	N	N	N	N
Single span skyline without slack pulling carriage	Where topography and other conditions permit one end suspension and reasonable polyloads. Full suspension if necessary and feasible.	A	N	N	N	N

continued on next page

Compatibility of Logging Systems With Commonly Used Silvicultural Systems and Regeneration Harvest Methods in Pacific Northwest Region

Logging system ¹	Normal operating constraints	Commonly Used Silvicultural Systems and Regeneration Harvest Methods				
		Even-aged Mgt		Uneven-aged Mgt		
		Clearcut	Seed Tree	Shelter-wood	Group Selection	Single Tree Selection
Single span skyline with slack pulling carriage	Same as above	A	A	A	A	A
Multispan skyline w/slack pulling	Same as single span w/slack pulling carriage except topography does not provide single span deflection but does meet multi-span requirements	A	A	A	A	A
Balloon	Where log suspension requirements and road and landing constraints cannot be met with skylines but can with balloon and balloon equipment is available	A	N	N	N	N
Helicopter	Use only where cheaper systems cannot meet land management objectives	A	A	A	A	A

¹Economic considerations: In general, the cheapest system which can meet established land management requirements such as protection of soil, water quality, residual stands, visual resource etc. should be used.

²A = Generally acceptable

N = Generally not recommended

Logging System references

Cable Logging Systems, USDA Forest Service, (Unpublished) 1974, Studier, Donald D. and Virgil W. Binkley.

Small Yarder Comparison, USDA Forest Service, (Unpublished) 1979, Seabaugh, James and Vern Yerkes.

Cable Harvesting Systems For Small Timber, Vermont Dept. of Forests, Parks and Recreation, 1979, Hawkes, Gerry E.

Timber Sale Preparation Guide For Helicopter Logging, USDA Forest Service (Unpublished).

Criteria c. The selected silvicultural system must be capable of providing special conditions such as a continuous canopy or continuous high density live root mats when required by critical soil conditions or needed to achieve management objective such as streamside protection, wildlife needs, and visual resources.

Discussion:

The following systems and methods develop stand conditions required for meeting resource management objectives over the longest period of time.

Commonly used Silvicultural Systems and Regeneration Harvest Methods to achieve desired forest character

Desired Character ^{1 2}	Commonly Used Regeneration Harvest Method ³	
	Even-aged System	Uneven-aged System
Continuous site occupancy with trees	Shelterwood	Single tree selection
High density live root mat	Shelterwood	Single tree selection
Mosaic of forest and opening	Clearcut, seed tree and shelterwood	Not applicable
Maximum wildlife species diversity	Clearcut	Not applicable
Maximum tree species diversity	Shelterwood	Group selection

¹ USDA Forest Service 1980; "National Forest Landscape Management," Volume 2, Timber Chapter, Agriculture Handbook No. 559.

² USDA Forest Service 1979; Wildlife Habitats in Managed Forests, Agriculture Handbook No. 553.

³ National Forest Management Act, 1976.

Criteria d. The selected silvicultural system will permit control of existing or potential vegetation to a degree that establishment of numbers of trees, other desirable vegetation, and rates of growth as identified

in site specific silvicultural prescriptions for harvest areas can be achieved.

Discussion:

An increase in production of vegetation for livestock or wildlife can increase reforestation difficulty. The following systems and methods maximize the specific vegetation emphasis listed and may or may not be suitable for providing the other vegetation conditions.

Commonly used silvicultural systems and regeneration harvest methods to permit vegetation control to establish the numbers of trees and other desired vegetation

Vegetation Emphasis	Commonly Used Regeneration Harvest Method	
	Even-aged System	Uneven-aged System
Wildlife forage	Clearcut	Non applicable
Livestock forage	Clearcut	Group selection
Woody vegetation ¹	Clearcut	Non applicable
Herbaceous vegetation	Shelterwood	Group selection Individual tree selection
Seedling and sapling tree growth rate	Clearcut	Non applicable
Tree seedling survival on southwest to southeast aspects ²	Shelterwood	Group selection

¹ Regenerating Oregon Forests by Cleary, Greaves, and Hermann, 1978.

² Results of Shelterwood Harvesting of Douglas-fir in the Cascades of Western Oregon, Richard Williamson, PNW-171, 1973.

Commonly used silvicultural systems and harvest methods relating vegetative competition to tree regeneration and desired growth rates

Vegetation Zones ¹	Aspect	Commonly Used Regeneration Harvest Method ²	
		Even-aged System	Uneven-aged System
Picea sitchensis (Sitka spruce)	All	Clearcut	Non applicable
Tsuga heterophylla (Western hemlock)	North	Clearcut	Group Selection
	South	Clearcut & Shelter-wood	Group Selection
Mixed conifer &	North	Clearcut & Shelter-wood	Non applicable
Mixed evergreen	South	Shelter-wood	Group selection
Pinus ponderosa (Ponderosa pine)	All	Shelter wood	Group selection
Abies grandis & Psuedotsuga Menziesii (Douglas-fir)	All	Shelter-wood & Clearcut	Group selection
Subalpine forests	All	Shelter-wood	Single tree selection

¹ Natural Vegetation of Oregon and Washington USDA Forest Service, Gen. Tech. Report PNW-8, 1973.

² Regional Silviculture of the US, 2nd Edition, 1980 John W. Barrett, Editor.

Criteria e. The silvicultural system selected will promote stand structure and species composition which avoids serious risk of damage from mammals, insects, disease, or wildfire and will allow treatment of existing insect, disease, or fuel conditions.

Discussion:

The appropriate system or regeneration method in the presence of a specific damaging agent usually varies with the individual characteristics of the local situation. However, certain damaging agents are uniformly mitigated by specific silvicultural treatments. These are shown in the following display.

Commonly Used Silvicultural Systems and Regeneration Harvest Methods Favorable to Reduction and Treatment of Damaging Agents

Damaging Agent	Important Factors	Commonly Used Regeneration Harvest Methods	
		Even-aged System	Uneven aged System
Dwarf Mistletoe or Phellinus weirii ¹ (root rot)	1. Removal of infected tree species 2. Elimination of disease spread mechanism.	Clear-cut	Not applicable
Wildfire	1. Ability to treat created fuels. 2. Avoidance of continuous fuel.	Clear-cut Shelter-wood	Single Tree Selection, Group Selection
Windthrow ²	1. Maintenance of stand density. 2. Design of cutting pattern. 3. Location with respect to topography and degree of storm hazard.	Clear-cut	Single Tree Selection, Group Selection
Gophers ³	1. Avoidance of habitat creation	Shelter-wood	Single Tree Selection, Group Selection

¹ Biology and Classification of Dwarf Mistletoes
Agriculture Handbook No. 401, Hawsworth, Frank and
Delbert Wiens, 1972.

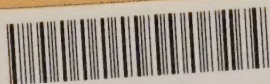
² Windthrow Around Staggered Settings in Old Growth
Douglas-fir, 1956, Henry Gratkowski, Forest Science.

³ Response of Gopher Population to Silvicultural
Practices in Central Oregon. Victor Barnes Jr. pp
167-175, Symp. Proc.: Wildlife and Forest Management
in the Pacific Northwest.

Criteria f. The silvicultural system selected must
meet resource allocation and vegetation management
objectives identified in Regional and Forest Plans.
Silvicultural systems for specific areas may be
identified in Forest Plans, environmental assessments,
or in silvicultural prescriptions written or reviewed by a
certified silviculturist except where provided for
otherwise by legislation or regulation.

Discussion:

Individual site conditions frequently require site
specific decisions which are responsive to land
management objectives and are usually developed with
individual prescriptions. The silvicultural system has
also been designated by legislation for specific areas.



R0000 889365



R0000 889365